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Wu et al.

(10) **Patent No.: US 8,411,646 B2**
(45) **Date of Patent: Apr. 2, 2013**

(54) **OPPORTUNISTIC UPLINK SCHEDULING**

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(73) Assignee: **QUALCOMM Incorporated**, San Diego, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 953 days.

(21) Appl. No.: **11/943,517**

(22) Filed: **Nov. 20, 2007**

(65) **Prior Publication Data**

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(51) **Int. Cl.**
H04J 3/00 (2006.01)

(52) **U.S. Cl.** **370/336**; 370/345; 370/347; 370/348

(58) **Field of Classification Search** 370/310–350; 455/67.11, 406, 435.1, 42.1, 452.2, 450, 455/442, 595

See application file for complete search history.

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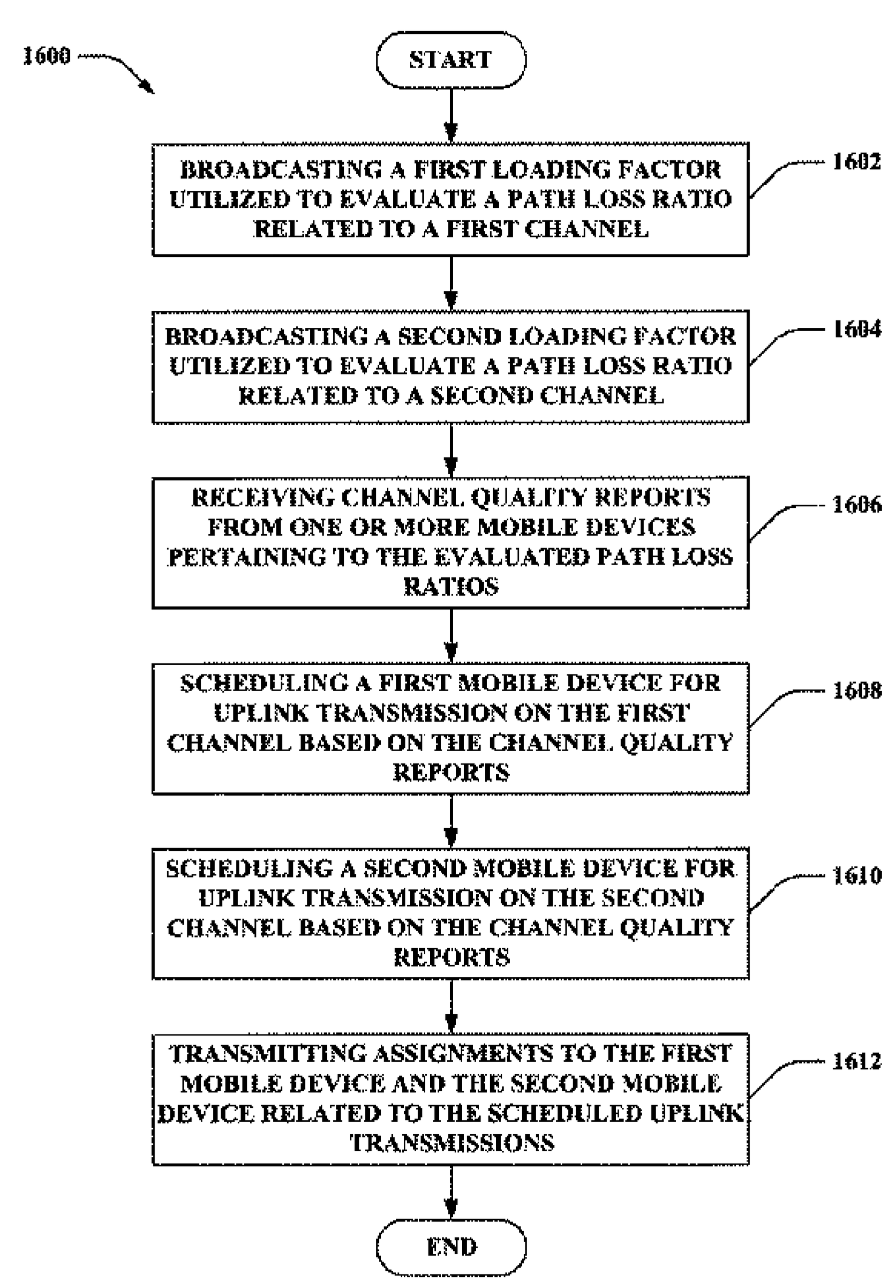
Primary Examiner — Andrew Chriss
Assistant Examiner — Kenan Cehic
(74) *Attorney, Agent, or Firm* — Donald C. Kordich

(57) **ABSTRACT**

Systems and methodologies are described that facilitate scheduling uplink transmissions. For instance, a time sharing scheme can be utilized such that differing mobile devices can be scheduled to transmit during differing time slots; however, it is also contemplated that a static scheme can be employed. Pursuant to an illustration, an interference budget can be combined with a time varying weighting factor associated with a base station; the weighting factor can be predefined and/or adaptively adjusted (e.g., based upon a load balancing mechanism). Moreover, the weighted interference budget can be leveraged for selecting mobile devices for uplink transmission (e.g., based at least in part upon path loss ratios of the mobile devices). Further, disparate interference budgets can be utilized by differing channels of a sector at a particular time. Also, for example, a base station can assign a loading factor to be utilized by wireless terminal(s) for generating channel quality report(s).

37 Claims, 26 Drawing Sheets



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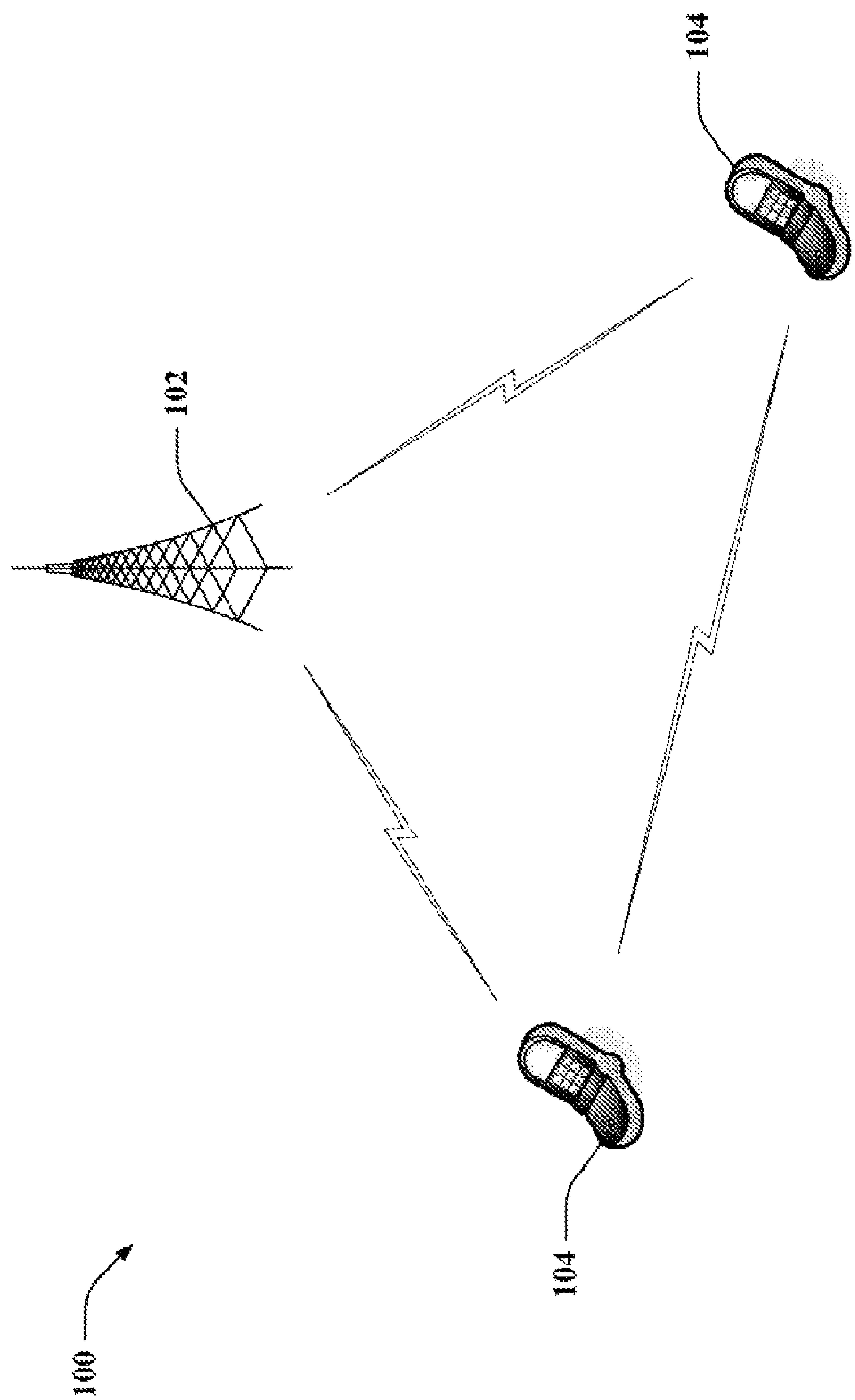
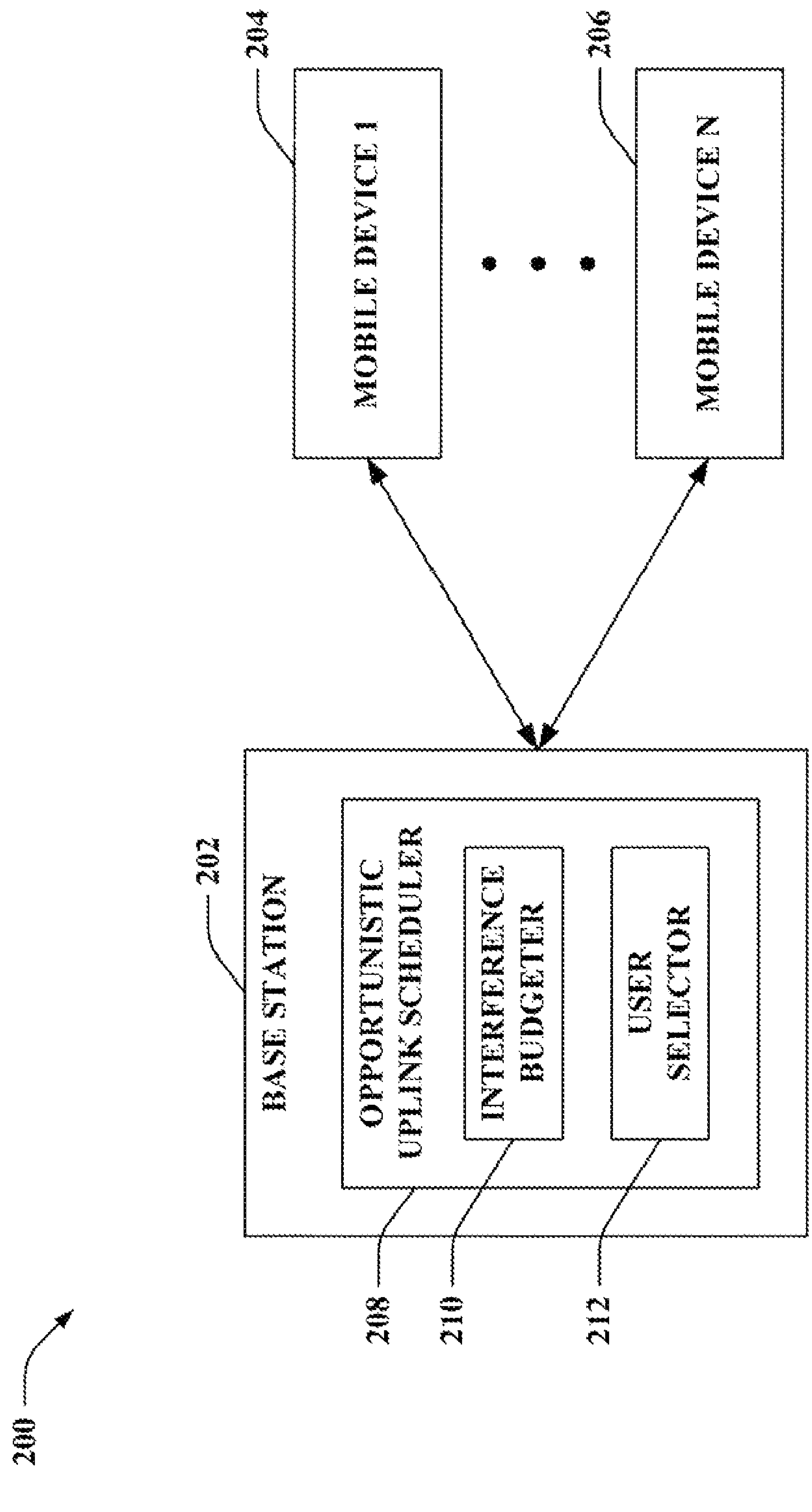


FIG. 1



200
202
BASE STATION
OPPORTUNISTIC UPLINK SCHEDULER
INTERFERENCE BUDGETER
USER SELECTOR
208
210
212
204
MOBILE DEVICE 1
206
MOBILE DEVICE N

FIG. 2

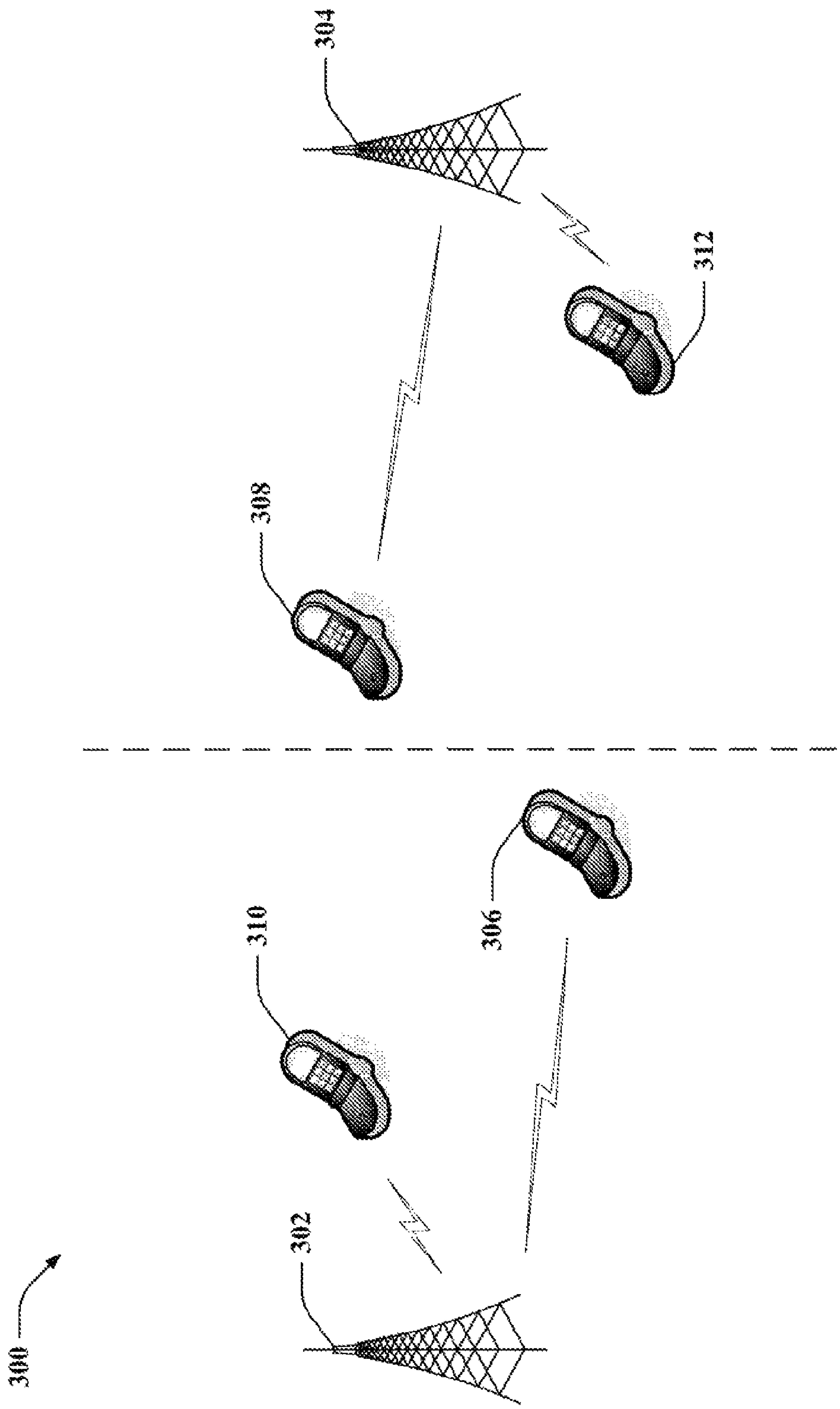


FIG. 3

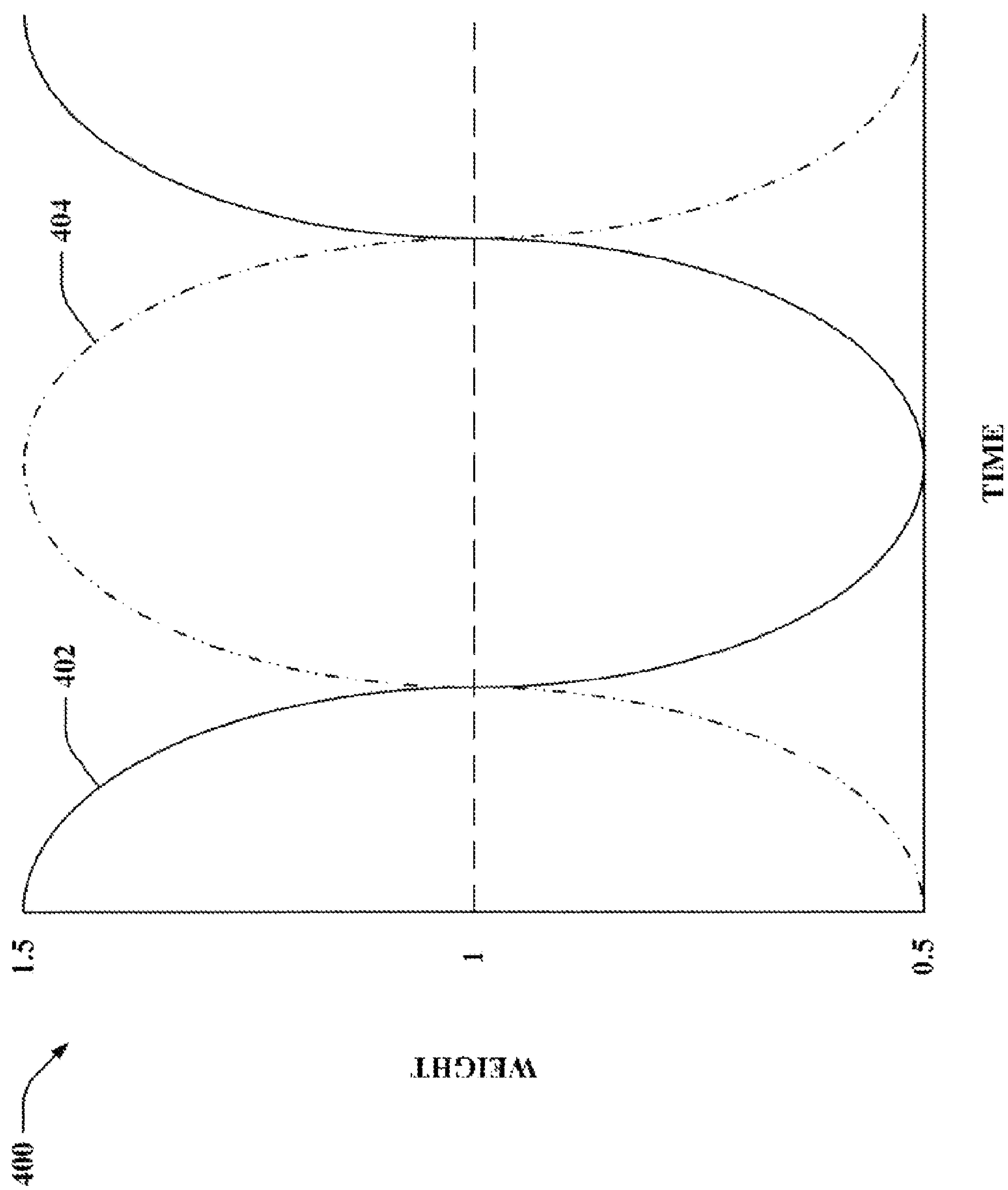
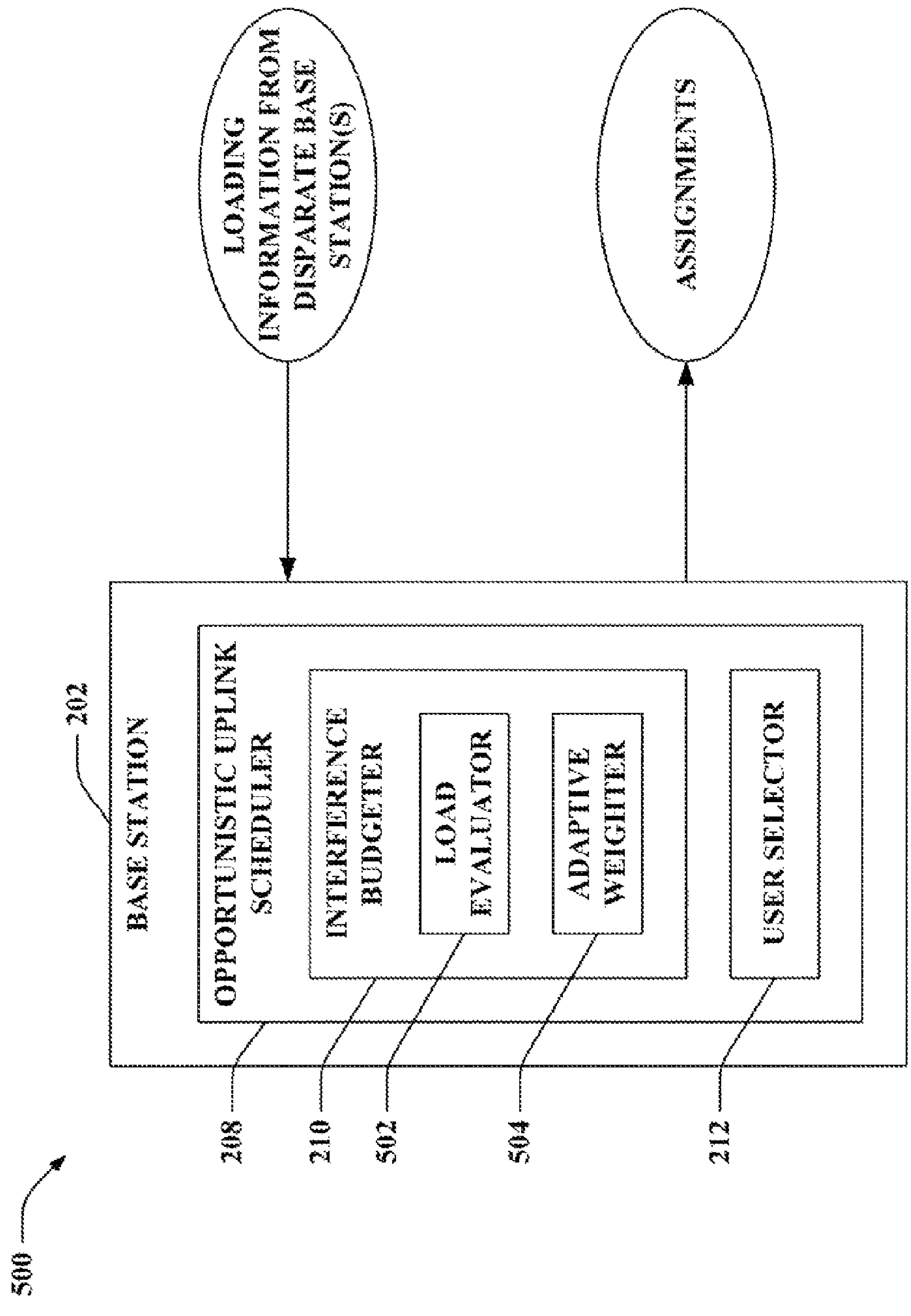


FIG. 4



500
202
BASE STATION
OPPORTUNISTIC UPLINK SCHEDULER
INTERFERENCE BUDGETER
LOAD EVALUATOR
ADAPTIVE WEIGHTER
USER SELECTOR
208
210
502
504
212
LOADING INFORMATION FROM DISPARATE BASE STATION(S)
ASSIGNMENTS

FIG. 5

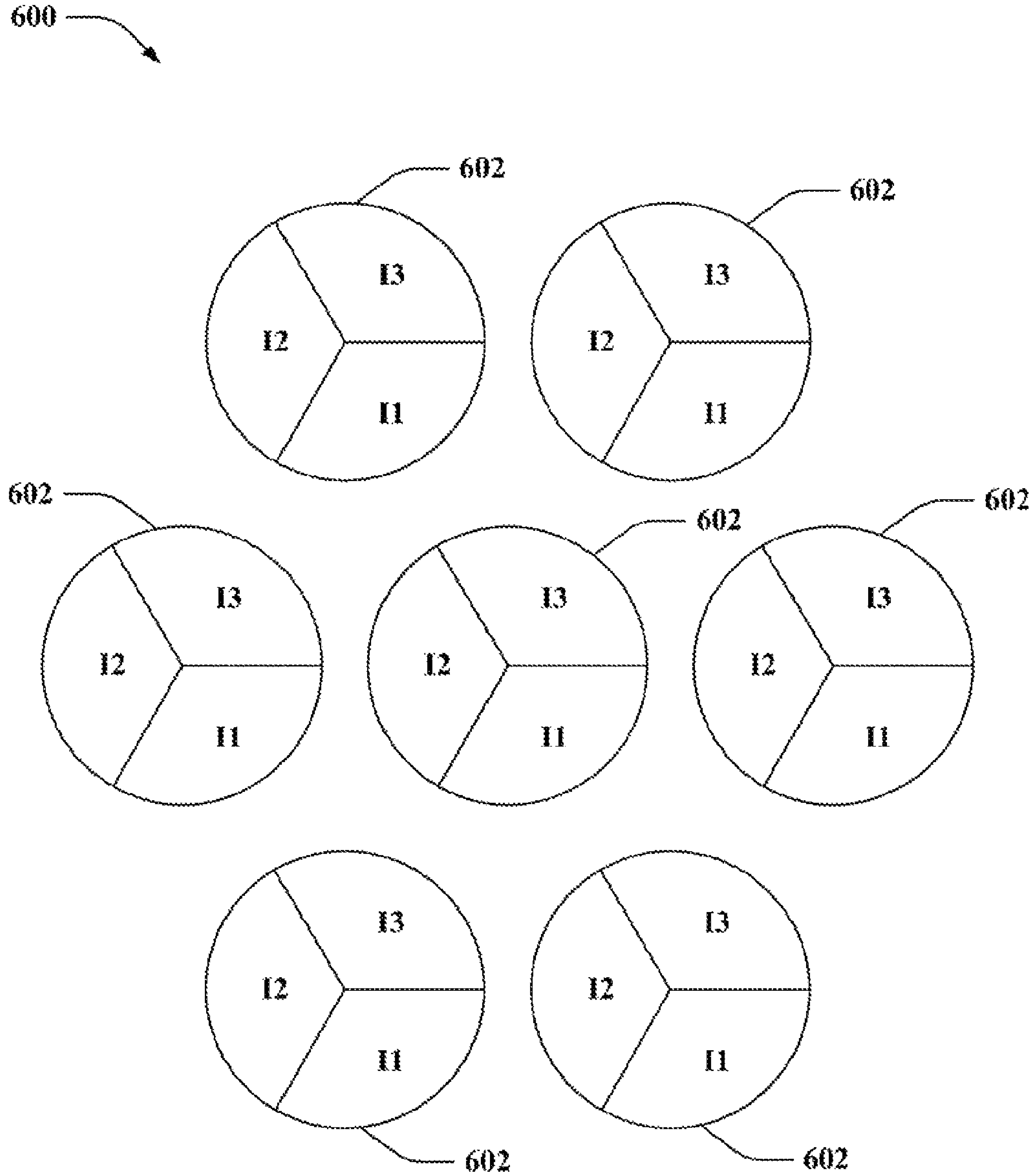

600
602
602
602
602
602
602
602
I3
I2
I1
I3
I2
I1
I3
I2
I1
I3
I2
I1
I3
I2
I1
I3
I2
I1
I3
I2
I1

FIG. 6

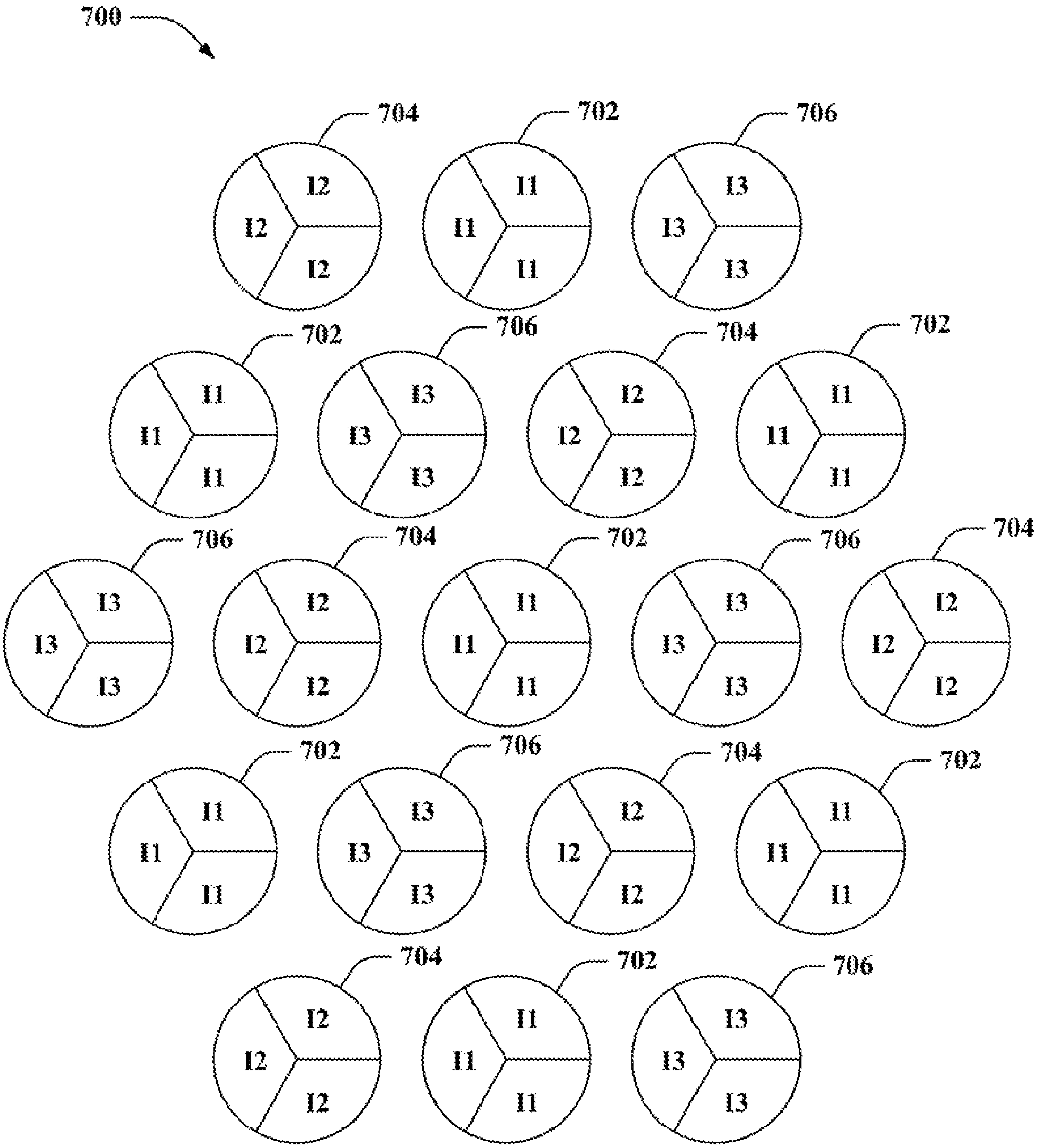
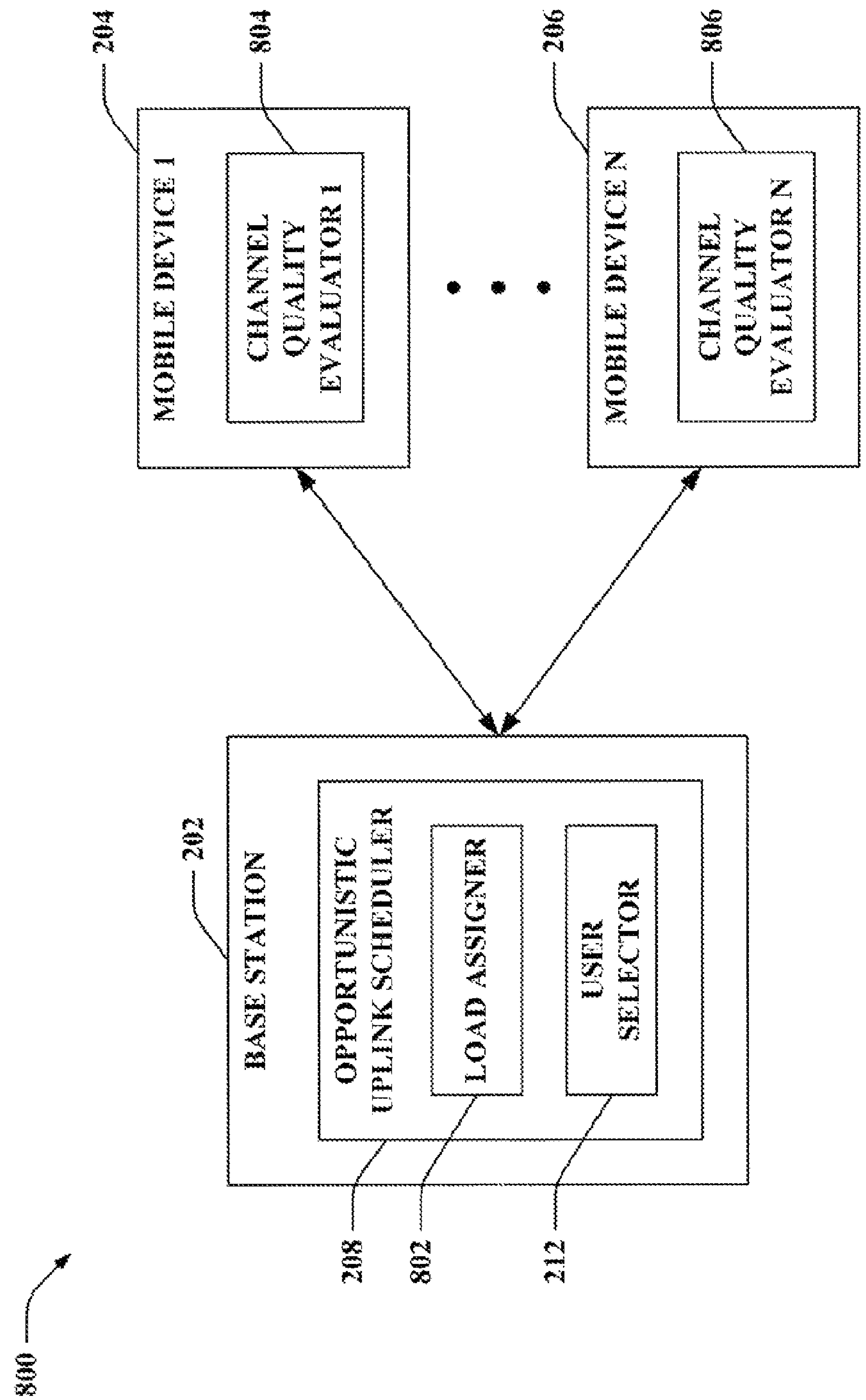

700
704
702
706
I2
I1
I3
702
706
704
702
706
704
702
706
704
702
706
704
702
704
702
706

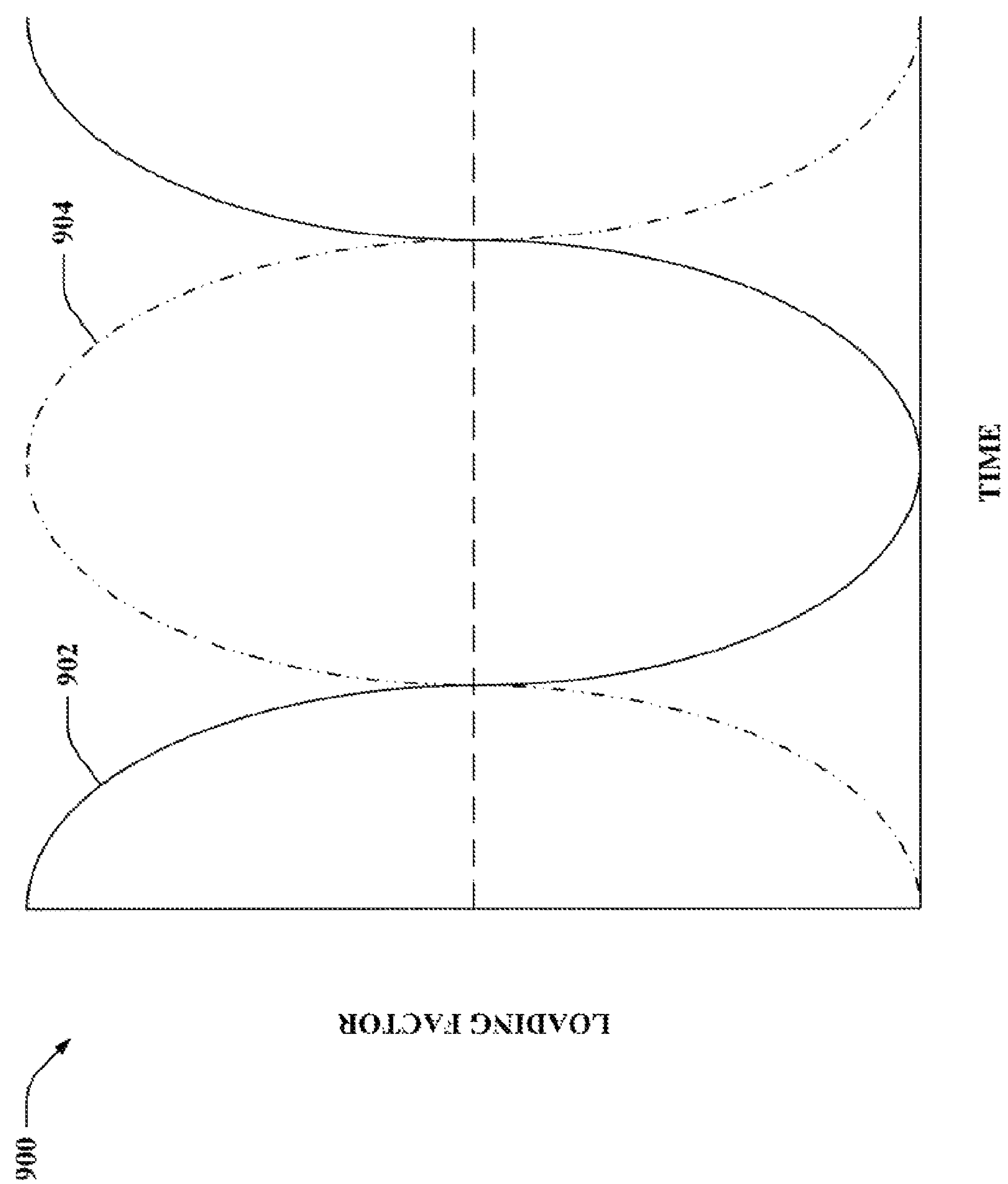
FIG. 7



204
804
206
806
MOBILE DEVICE 1
CHANNEL QUALITY EVALUATOR 1
MOBILE DEVICE N
CHANNEL QUALITY EVALUATOR N
202
BASE STATION
OPPORTUNISTIC UPLINK SCHEDULER
LOAD ASSIGNER
USER SELECTOR
208
802
212
800

FIG. 8

FIG. 9



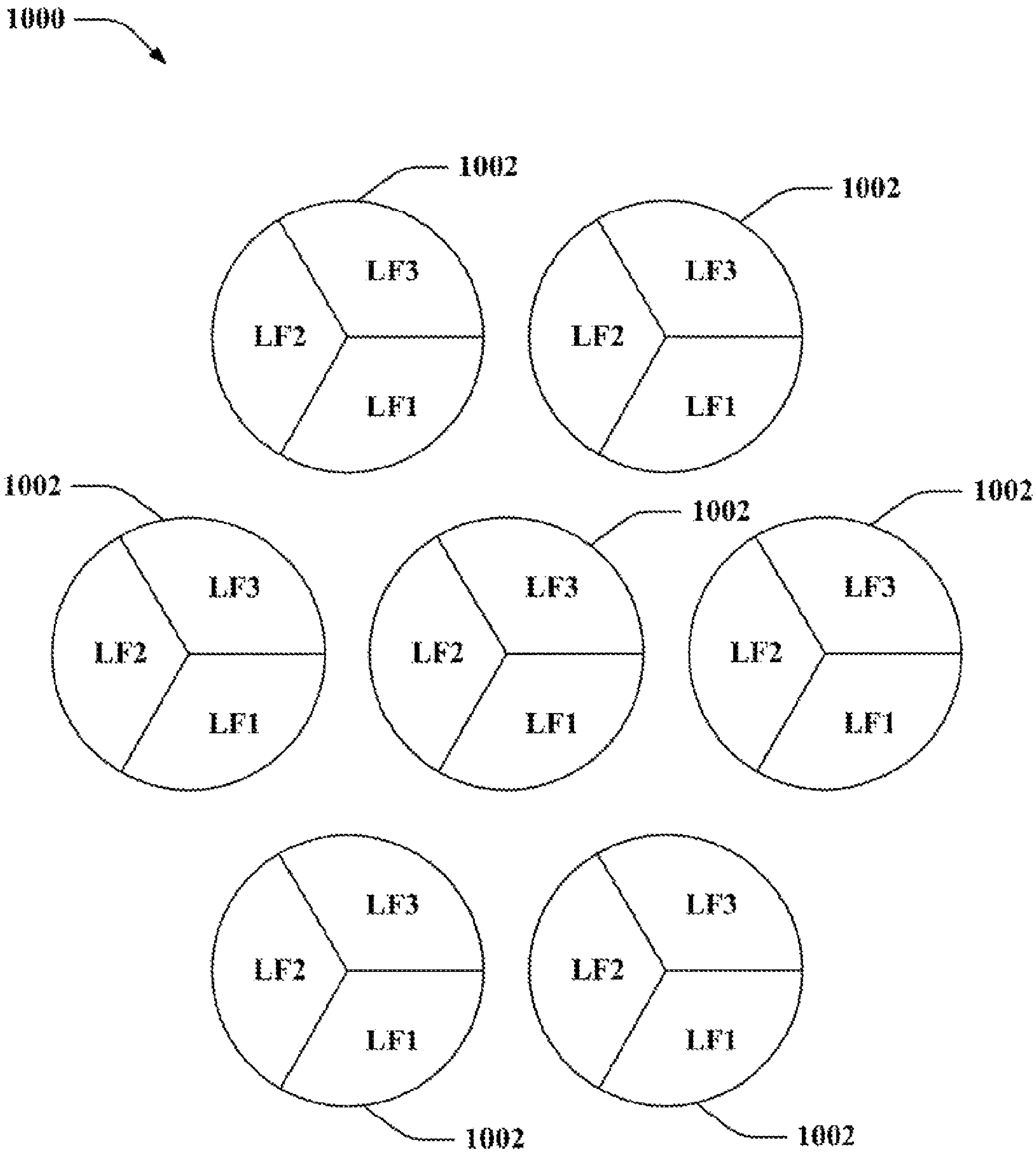
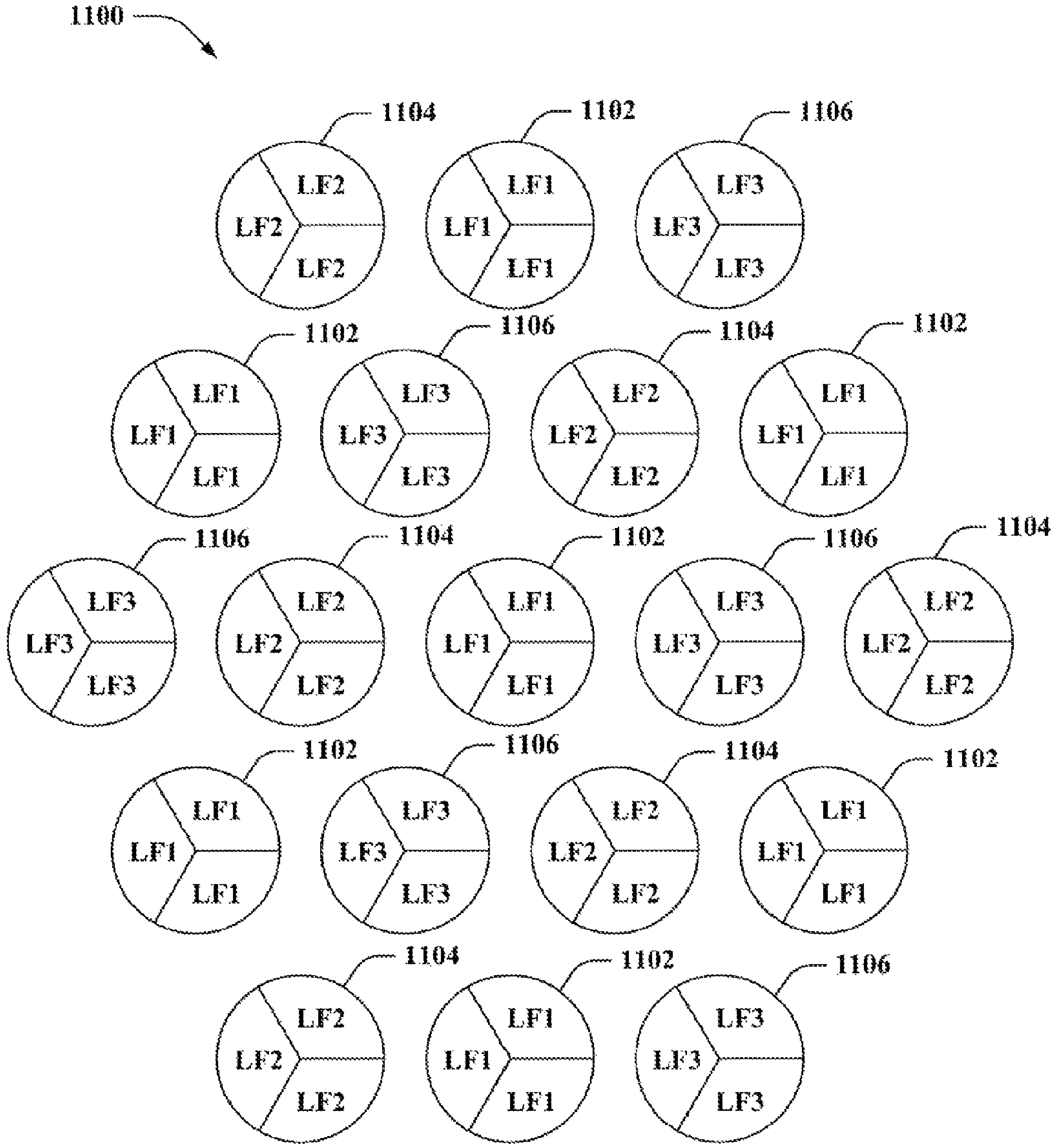

1000
1002
1002
LF3
LF2
LF1
LF3
LF2
LF1
1002
1002
1002
LF3
LF2
LF1
LF3
LF2
LF1
LF3
LF2
LF1
LF3
LF2
LF1
LF3
LF2
LF1
1002
1002

FIG. 10


1100
1104
LF2
LF2
LF2
1102
LF1
LF1
LF1
1106
LF3
LF3
LF3
1102
LF1
LF1
LF1
1106
LF3
LF3
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1104
LF2
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LF2
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LF1
1106
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LF3
LF3
1104
LF2
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LF2
1102
LF1
LF1
LF1
1106
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LF3
1104
LF2
LF2
LF2
1102
LF1
LF1
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1106
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1104
LF2
LF2
LF2
1102
LF1
LF1
LF1
1104
LF2
LF2
LF2
1102
LF1
LF1
LF1
1106
LF3
LF3
LF3

FIG. 11

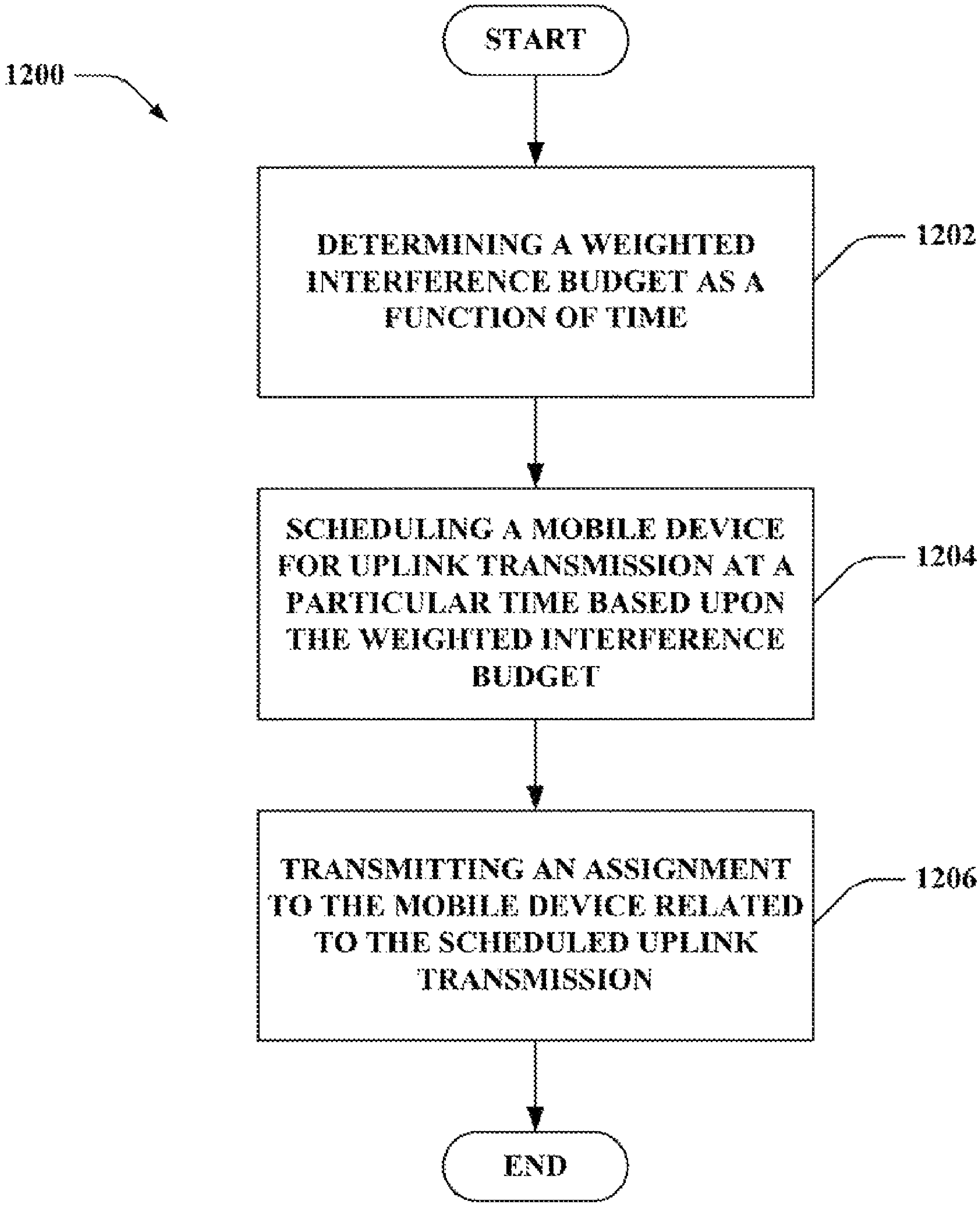
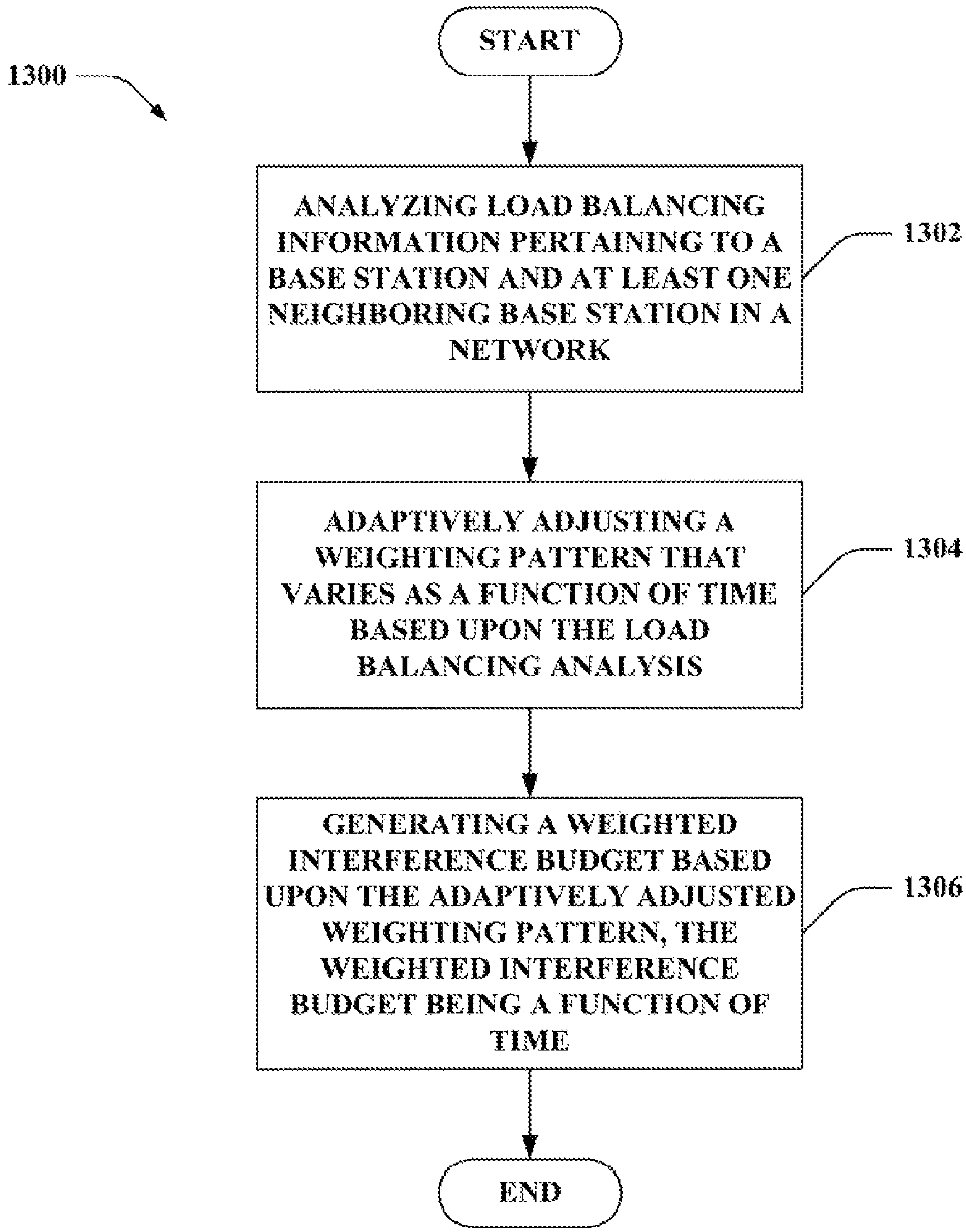

1200
START
DETERMINING A WEIGHTED INTERFERENCE BUDGET AS A FUNCTION OF TIME
1202
SCHEDULING A MOBILE DEVICE FOR UPLINK TRANSMISSION AT A PARTICULAR TIME BASED UPON THE WEIGHTED INTERFERENCE BUDGET
1204
TRANSMITTING AN ASSIGNMENT TO THE MOBILE DEVICE RELATED TO THE SCHEDULED UPLINK TRANSMISSION
1206
END

FIG. 12



1300
START
ANALYZING LOAD BALANCING INFORMATION PERTAINING TO A BASE STATION AND AT LEAST ONE NEIGHBORING BASE STATION IN A NETWORK
1302
ADAPTIVELY ADJUSTING A WEIGHTING PATTERN THAT VARIES AS A FUNCTION OF TIME BASED UPON THE LOAD BALANCING ANALYSIS
1304
GENERATING A WEIGHTED INTERFERENCE BUDGET BASED UPON THE ADAPTIVELY ADJUSTED WEIGHTING PATTERN, THE WEIGHTED INTERFERENCE BUDGET BEING A FUNCTION OF TIME
1306
END

FIG. 13

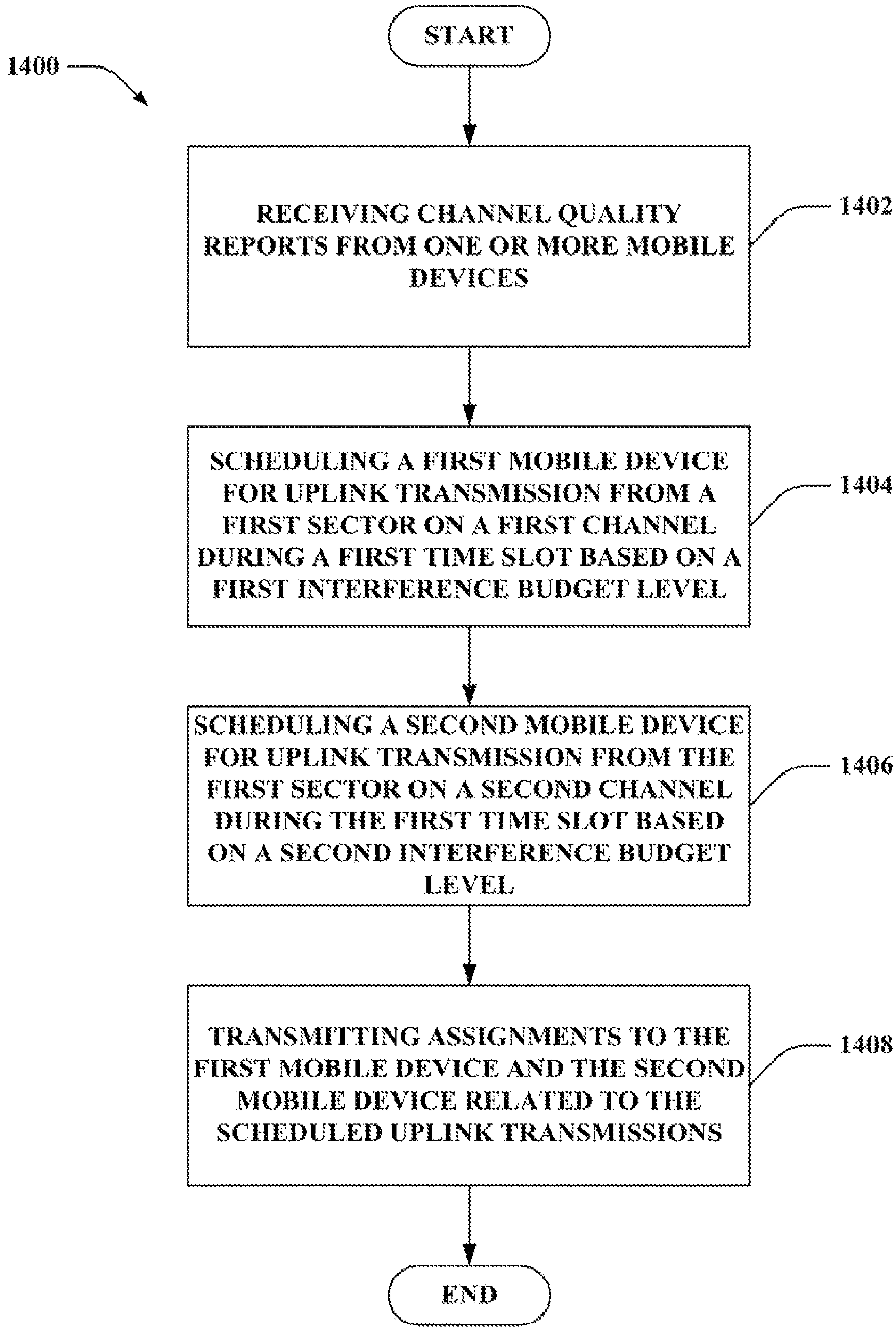

START
1400
RECEIVING CHANNEL QUALITY REPORTS FROM ONE OR MORE MOBILE DEVICES
1402
SCHEDULING A FIRST MOBILE DEVICE FOR UPLINK TRANSMISSION FROM A FIRST SECTOR ON A FIRST CHANNEL DURING A FIRST TIME SLOT BASED ON A FIRST INTERFERENCE BUDGET LEVEL
1404
SCHEDULING A SECOND MOBILE DEVICE FOR UPLINK TRANSMISSION FROM THE FIRST SECTOR ON A SECOND CHANNEL DURING THE FIRST TIME SLOT BASED ON A SECOND INTERFERENCE BUDGET LEVEL
1406
TRANSMITTING ASSIGNMENTS TO THE FIRST MOBILE DEVICE AND THE SECOND MOBILE DEVICE RELATED TO THE SCHEDULED UPLINK TRANSMISSIONS
1408
END

FIG. 14

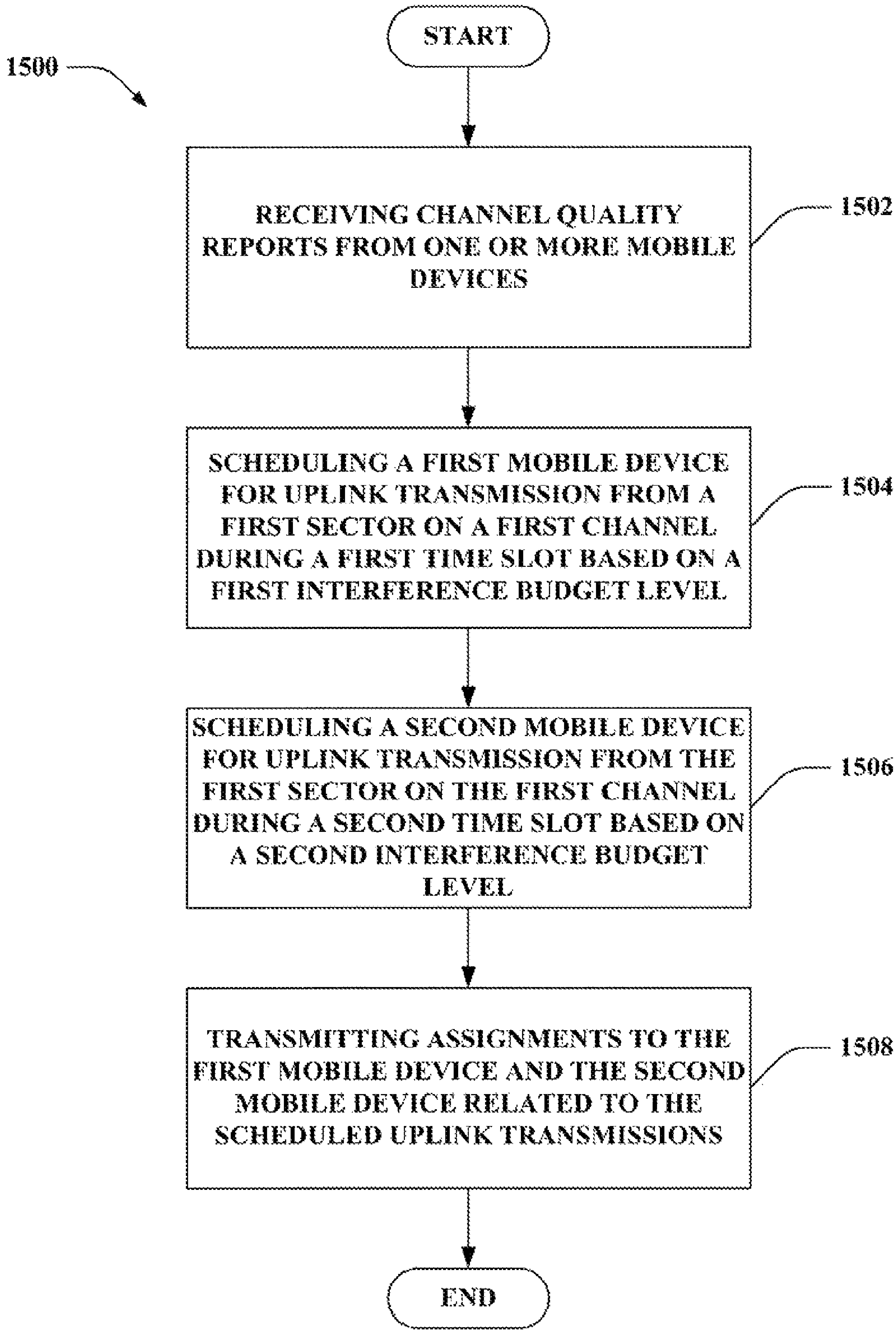

START
1500
RECEIVING CHANNEL QUALITY REPORTS FROM ONE OR MORE MOBILE DEVICES
1502
SCHEDULING A FIRST MOBILE DEVICE FOR UPLINK TRANSMISSION FROM A FIRST SECTOR ON A FIRST CHANNEL DURING A FIRST TIME SLOT BASED ON A FIRST INTERFERENCE BUDGET LEVEL
1504
SCHEDULING A SECOND MOBILE DEVICE FOR UPLINK TRANSMISSION FROM THE FIRST SECTOR ON THE FIRST CHANNEL DURING A SECOND TIME SLOT BASED ON A SECOND INTERFERENCE BUDGET LEVEL
1506
TRANSMITTING ASSIGNMENTS TO THE FIRST MOBILE DEVICE AND THE SECOND MOBILE DEVICE RELATED TO THE SCHEDULED UPLINK TRANSMISSIONS
1508
END

FIG. 15

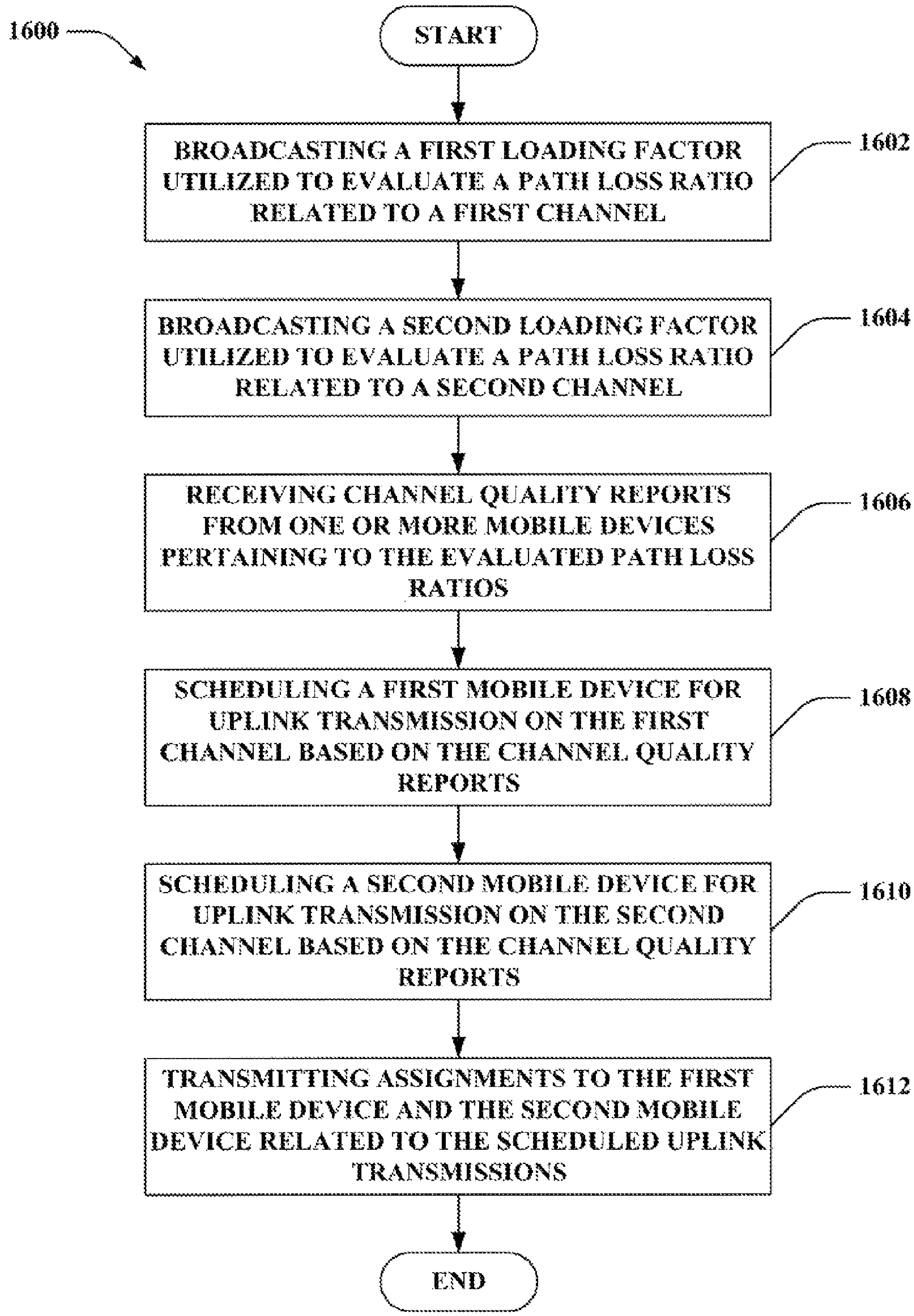

1600
START
BROADCASTING A FIRST LOADING FACTOR UTILIZED TO EVALUATE A PATH LOSS RATIO RELATED TO A FIRST CHANNEL
1602
BROADCASTING A SECOND LOADING FACTOR UTILIZED TO EVALUATE A PATH LOSS RATIO RELATED TO A SECOND CHANNEL
1604
RECEIVING CHANNEL QUALITY REPORTS FROM ONE OR MORE MOBILE DEVICES PERTAINING TO THE EVALUATED PATH LOSS RATIOS
1606
SCHEDULING A FIRST MOBILE DEVICE FOR UPLINK TRANSMISSION ON THE FIRST CHANNEL BASED ON THE CHANNEL QUALITY REPORTS
1608
SCHEDULING A SECOND MOBILE DEVICE FOR UPLINK TRANSMISSION ON THE SECOND CHANNEL BASED ON THE CHANNEL QUALITY REPORTS
1610
TRANSMITTING ASSIGNMENTS TO THE FIRST MOBILE DEVICE AND THE SECOND MOBILE DEVICE RELATED TO THE SCHEDULED UPLINK TRANSMISSIONS
1612
END

FIG. 16

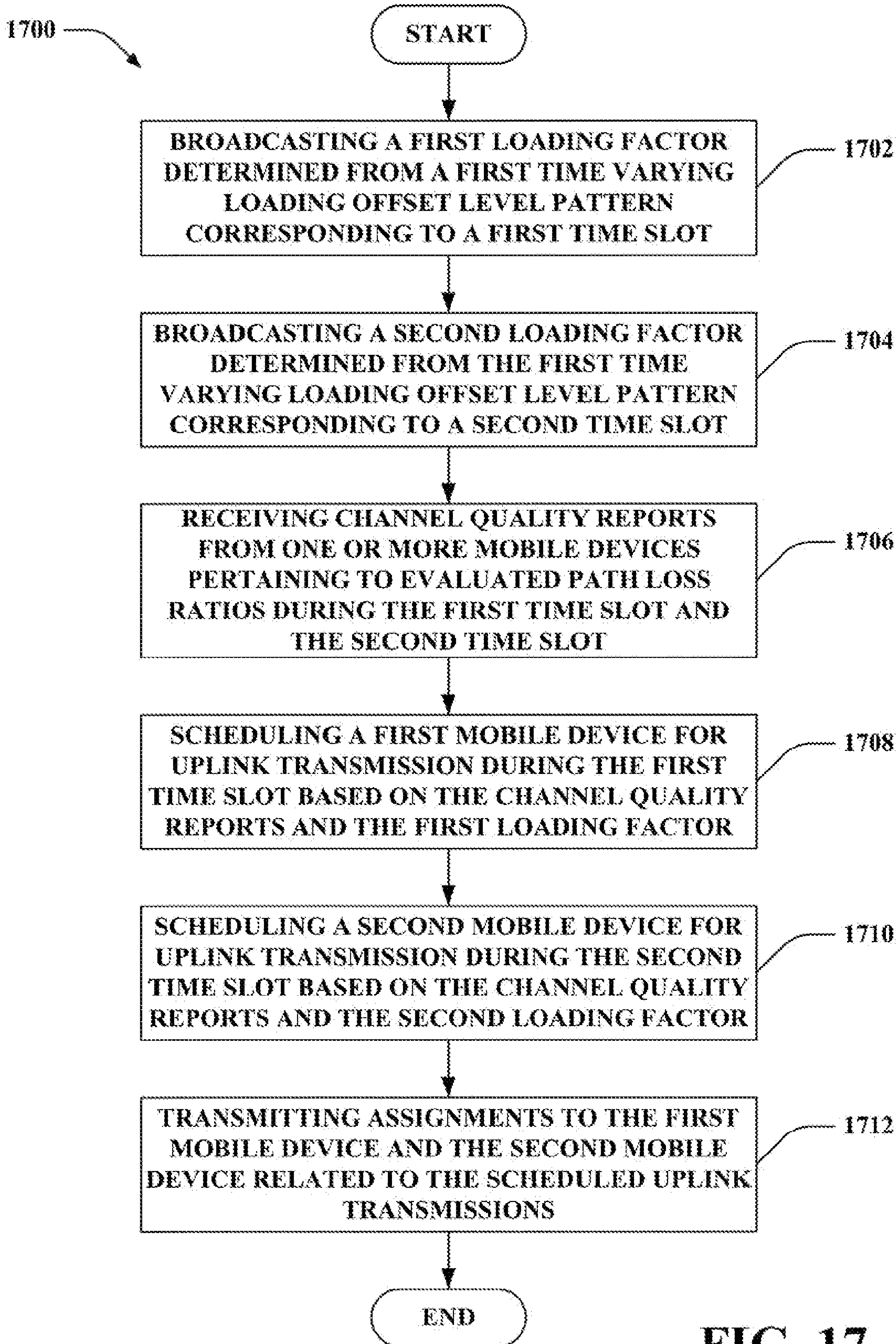
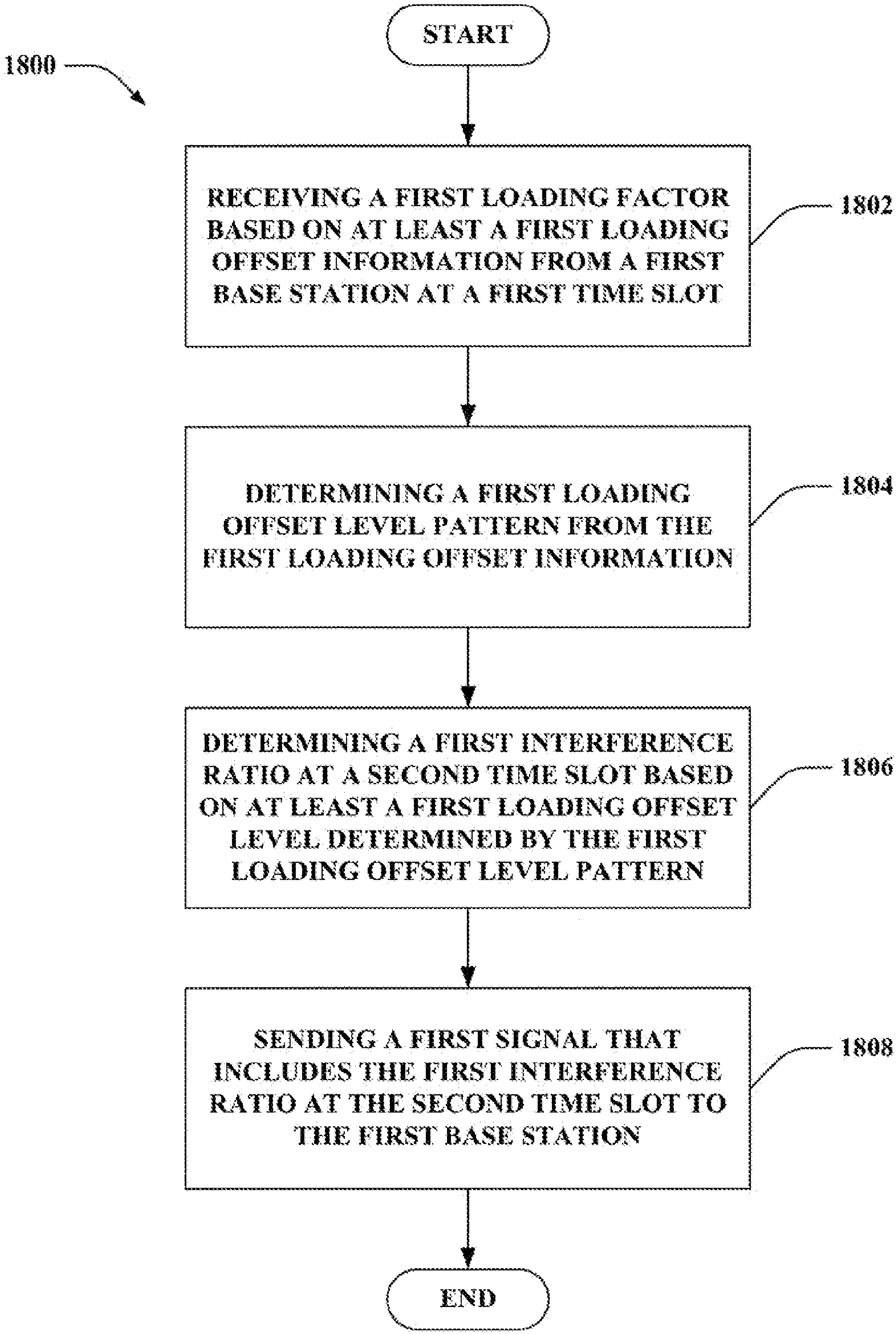

1700
START
BROADCASTING A FIRST LOADING FACTOR DETERMINED FROM A FIRST TIME VARYING LOADING OFFSET LEVEL PATTERN CORRESPONDING TO A FIRST TIME SLOT
1702
BROADCASTING A SECOND LOADING FACTOR DETERMINED FROM THE FIRST TIME VARYING LOADING OFFSET LEVEL PATTERN CORRESPONDING TO A SECOND TIME SLOT
1704
RECEIVING CHANNEL QUALITY REPORTS FROM ONE OR MORE MOBILE DEVICES PERTAINING TO EVALUATED PATH LOSS RATIOS DURING THE FIRST TIME SLOT AND THE SECOND TIME SLOT
1706
SCHEDULING A FIRST MOBILE DEVICE FOR UPLINK TRANSMISSION DURING THE FIRST TIME SLOT BASED ON THE CHANNEL QUALITY REPORTS AND THE FIRST LOADING FACTOR
1708
SCHEDULING A SECOND MOBILE DEVICE FOR UPLINK TRANSMISSION DURING THE SECOND TIME SLOT BASED ON THE CHANNEL QUALITY REPORTS AND THE SECOND LOADING FACTOR
1710
TRANSMITTING ASSIGNMENTS TO THE FIRST MOBILE DEVICE AND THE SECOND MOBILE DEVICE RELATED TO THE SCHEDULED UPLINK TRANSMISSIONS
1712
END

FIG. 17



1800
START
RECEIVING A FIRST LOADING FACTOR BASED ON AT LEAST A FIRST LOADING OFFSET INFORMATION FROM A FIRST BASE STATION AT A FIRST TIME SLOT
1802
DETERMINING A FIRST LOADING OFFSET LEVEL PATTERN FROM THE FIRST LOADING OFFSET INFORMATION
1804
DETERMINING A FIRST INTERFERENCE RATIO AT A SECOND TIME SLOT BASED ON AT LEAST A FIRST LOADING OFFSET LEVEL DETERMINED BY THE FIRST LOADING OFFSET LEVEL PATTERN
1806
SENDING A FIRST SIGNAL THAT INCLUDES THE FIRST INTERFERENCE RATIO AT THE SECOND TIME SLOT TO THE FIRST BASE STATION
1808
END

FIG. 18

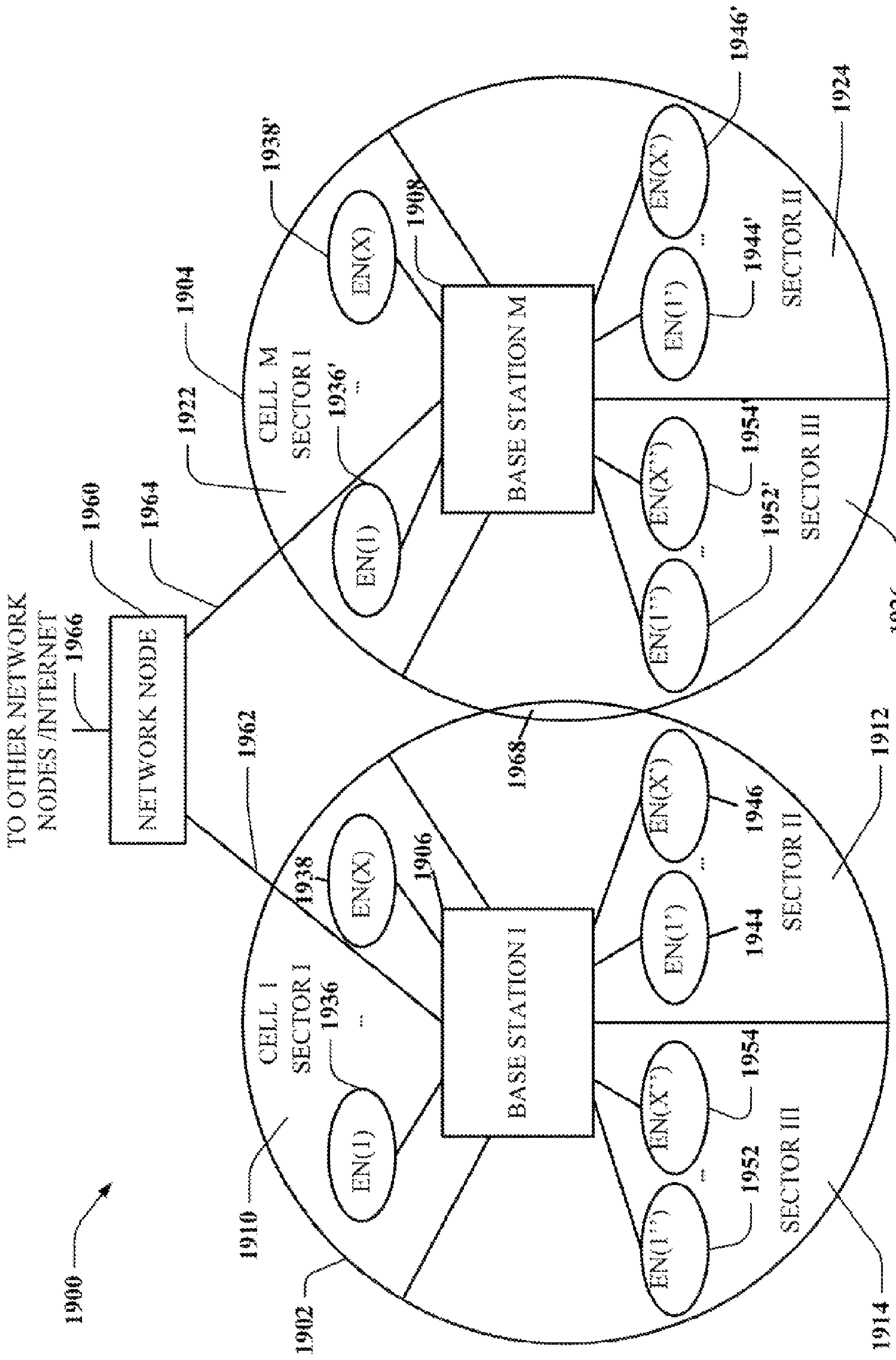

1900
TO OTHER NETWORK NODES /INTERNET
1966
NETWORK NODE
1960
1964
1962
1968
CELL 1
SECTOR I
1902
1910
1936
1938
1906
EN(1)
EN(X)
BASE STATION 1
EN(1')
EN(X')
1944
1946
SECTOR II
1912
EN(1'')
EN(X'')
1952
1954
SECTOR III
1914
CELL M
SECTOR I
1904
1922
1936'
1938'
1908
BASE STATION M
EN(1')
EN(X')
1944'
1946'
SECTOR II
1924
EN(1'')
EN(X'')
1952'
1954'
SECTOR III
1926

FIG. 19

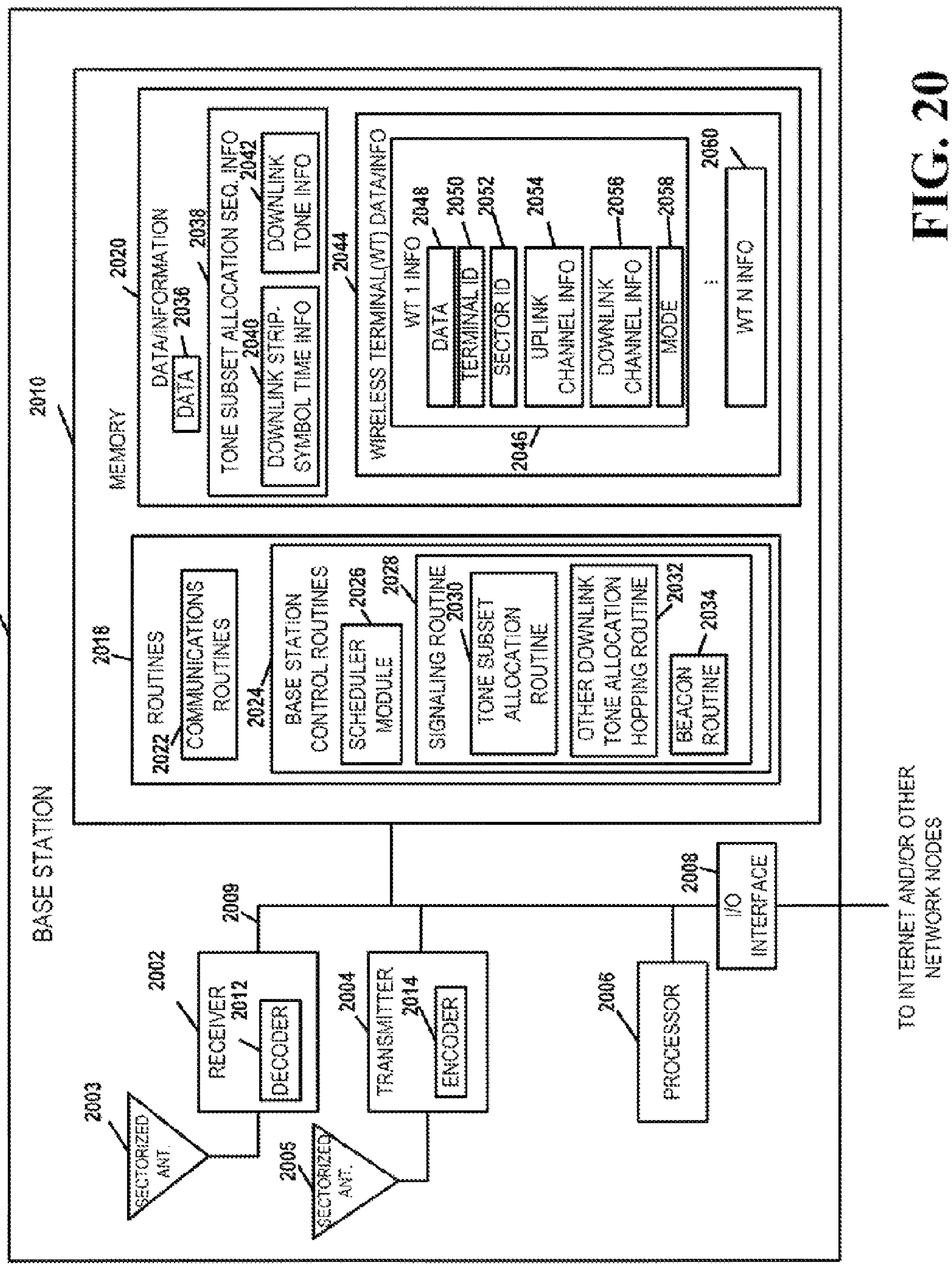
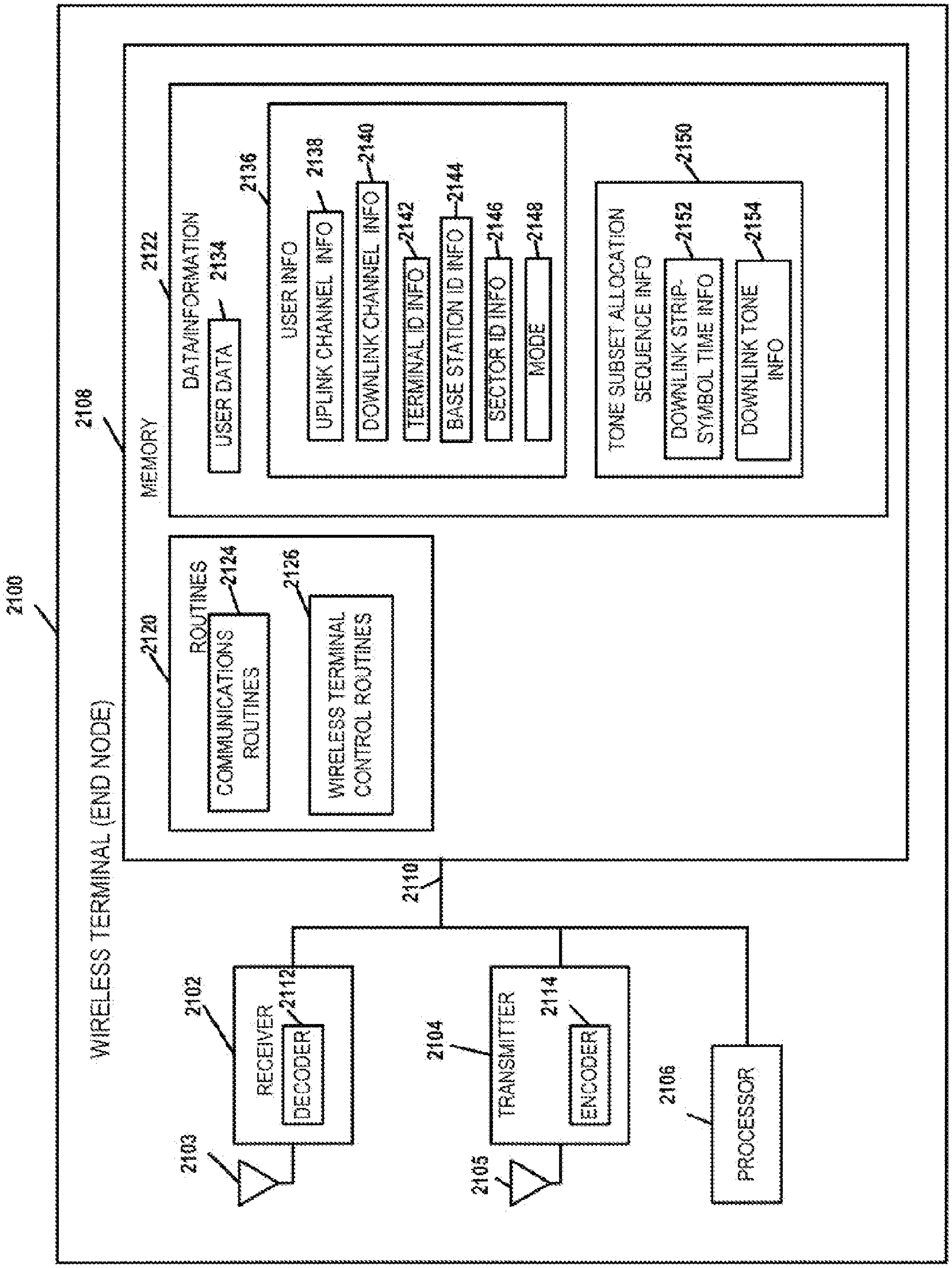

2000
BASE STATION
2010
MEMORY
2018
ROUTINES
2022
COMMUNICATIONS ROUTINES
2024
BASE STATION CONTROL ROUTINES
2026
SCHEDULER MODULE
2028
SIGNALING ROUTINE
2030
TONE SUBSET ALLOCATION ROUTINE
2032
OTHER DOWNLINK TONE ALLOCATION HOPPING ROUTINE
2034
BEACON ROUTINE
2020
DATA/INFORMATION
2036
DATA
2038
TONE SUBSET ALLOCATION SEQ. INFO
2040
DOWNLINK STRIP-SYMBOL TIME INFO
2042
DOWNLINK TONE INFO
2044
WIRELESS TERMINAL(WT) DATA/INFO
2046
WT 1 INFO
2048
DATA
2050
TERMINAL ID
2052
SECTOR ID
2054
UPLINK CHANNEL INFO
2056
DOWNLINK CHANNEL INFO
2058
MODE
2060
WT N INFO
2003
SECTORIZED ANT.
2002
RECEIVER
2012
DECODER
2009
2005
SECTORIZED ANT.
2004
TRANSMITTER
2014
ENCODER
2006
PROCESSOR
2008
I/O INTERFACE
TO INTERNET AND/OR OTHER NETWORK NODES

FIG. 20

FIG. 21


2100
WIRELESS TERMINAL (END NODE)
2108
MEMORY
2120
ROUTINES
2124
COMMUNICATIONS ROUTINES
2126
WIRELESS TERMINAL CONTROL ROUTINES
2122
DATA/INFORMATION
2134
USER DATA
2136
USER INFO
2138
UPLINK CHANNEL INFO
2140
DOWNLINK CHANNEL INFO
2142
TERMINAL ID INFO
2144
BASE STATION ID INFO
2146
SECTOR ID INFO
2148
MODE
2150
TONE SUBSET ALLOCATION SEQUENCE INFO
2152
DOWNLINK STRIP-SYMBOL TIME INFO
2154
DOWNLINK TONE INFO
2110
2102
RECEIVER
2112
DECODER
2103
2104
TRANSMITTER
2114
ENCODER
2105
2106
PROCESSOR

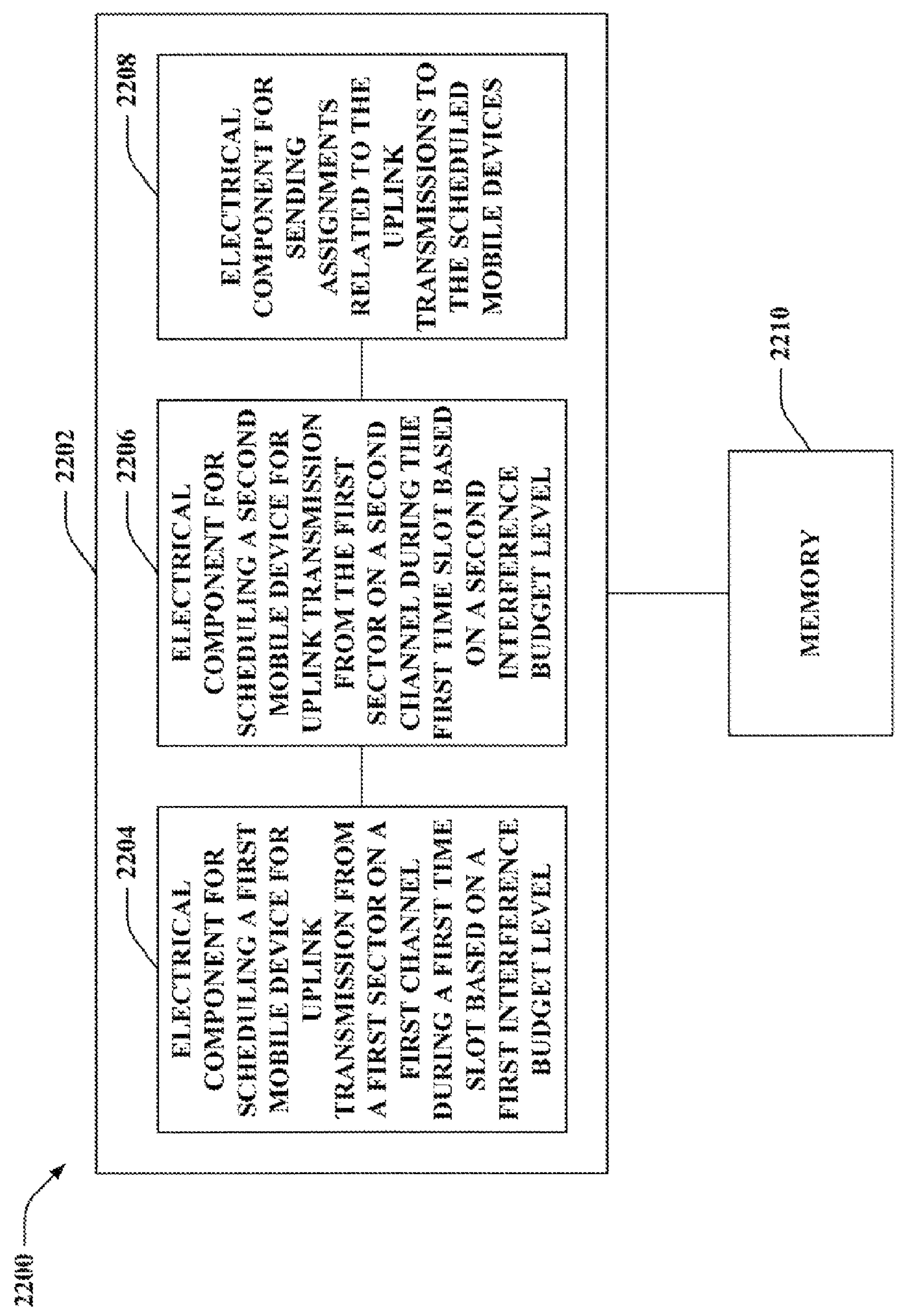

2200
2202
2204
ELECTRICAL COMPONENT FOR SCHEDULING A FIRST MOBILE DEVICE FOR UPLINK TRANSMISSION FROM A FIRST SECTOR ON A FIRST CHANNEL DURING A FIRST TIME SLOT BASED ON A FIRST INTERFERENCE BUDGET LEVEL
2206
ELECTRICAL COMPONENT FOR SCHEDULING A SECOND MOBILE DEVICE FOR UPLINK TRANSMISSION FROM THE FIRST SECTOR ON A SECOND CHANNEL DURING THE FIRST TIME SLOT BASED ON A SECOND INTERFERENCE BUDGET LEVEL
2208
ELECTRICAL COMPONENT FOR SENDING ASSIGNMENTS RELATED TO THE UPLINK TRANSMISSIONS TO THE SCHEDULED MOBILE DEVICES
2210
MEMORY

FIG. 22

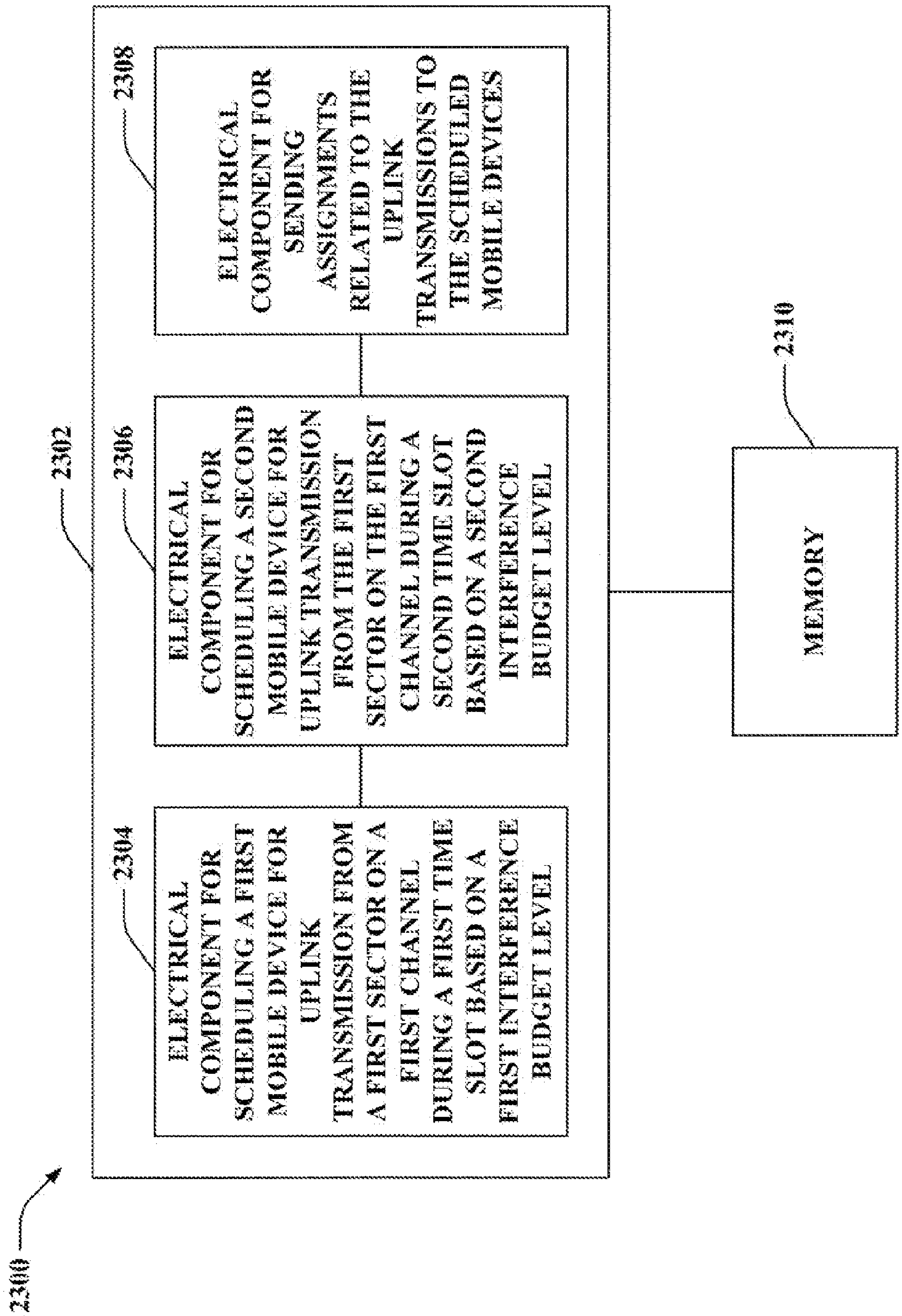

2300
2302
2304
ELECTRICAL COMPONENT FOR SCHEDULING A FIRST MOBILE DEVICE FOR UPLINK TRANSMISSION FROM A FIRST SECTOR ON A FIRST CHANNEL DURING A FIRST TIME SLOT BASED ON A FIRST INTERFERENCE BUDGET LEVEL
2306
ELECTRICAL COMPONENT FOR SCHEDULING A SECOND MOBILE DEVICE FOR UPLINK TRANSMISSION FROM THE FIRST SECTOR ON THE FIRST CHANNEL DURING A SECOND TIME SLOT BASED ON A SECOND INTERFERENCE BUDGET LEVEL
2308
ELECTRICAL COMPONENT FOR SENDING ASSIGNMENTS RELATED TO THE UPLINK TRANSMISSIONS TO THE SCHEDULED MOBILE DEVICES
2310
MEMORY

FIG. 23

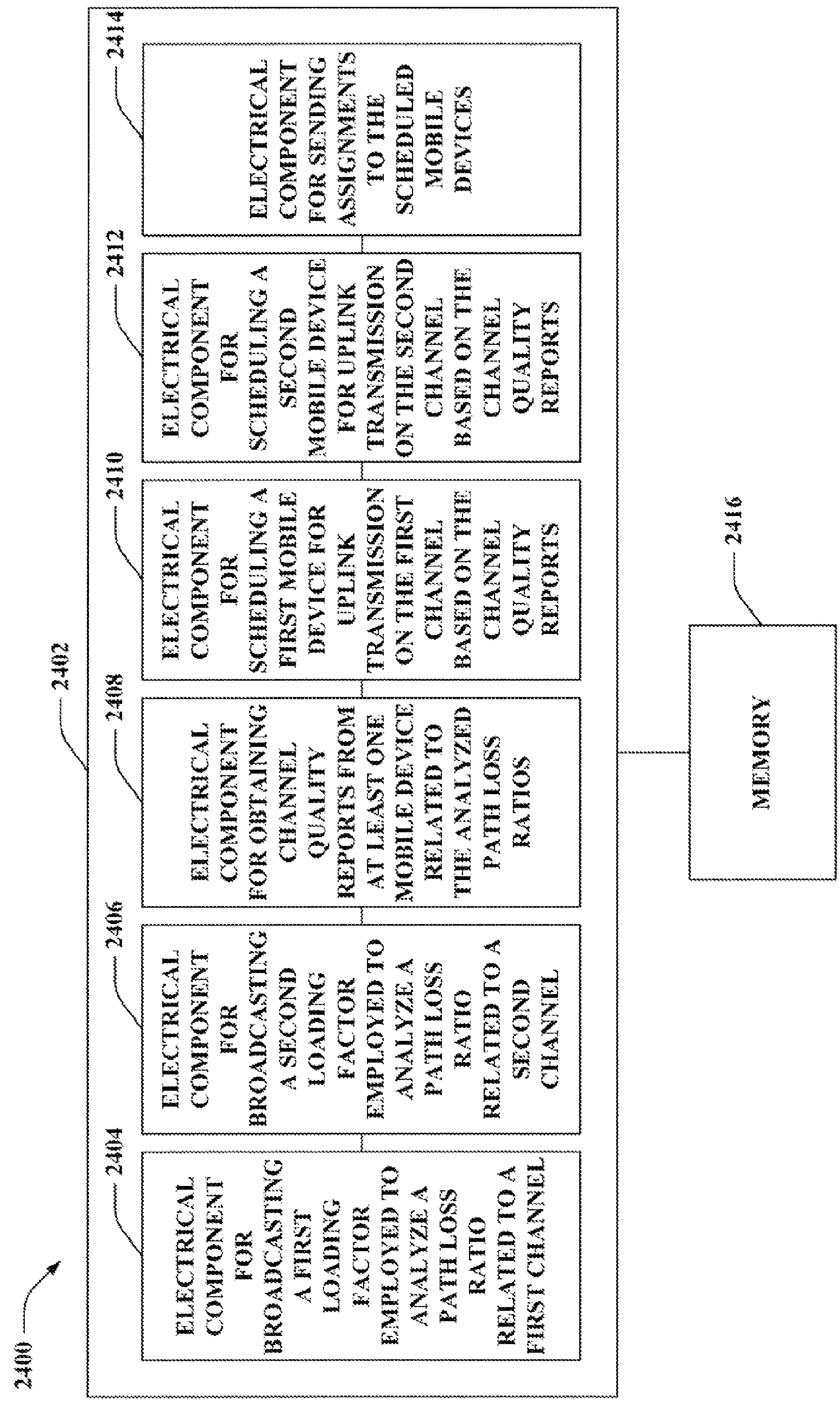

2400
2402
2404
ELECTRICAL COMPONENT FOR BROADCASTING A FIRST LOADING FACTOR EMPLOYED TO ANALYZE A PATH LOSS RATIO RELATED TO A FIRST CHANNEL
2406
ELECTRICAL COMPONENT FOR BROADCASTING A SECOND LOADING FACTOR EMPLOYED TO ANALYZE A PATH LOSS RATIO RELATED TO A SECOND CHANNEL
2408
ELECTRICAL COMPONENT FOR OBTAINING CHANNEL QUALITY REPORTS FROM AT LEAST ONE MOBILE DEVICE RELATED TO THE ANALYZED PATH LOSS RATIOS
2410
ELECTRICAL COMPONENT FOR SCHEDULING A FIRST MOBILE DEVICE FOR UPLINK TRANSMISSION ON THE FIRST CHANNEL BASED ON THE CHANNEL QUALITY REPORTS
2412
ELECTRICAL COMPONENT FOR SCHEDULING A SECOND MOBILE DEVICE FOR UPLINK TRANSMISSION ON THE SECOND CHANNEL BASED ON THE CHANNEL QUALITY REPORTS
2414
ELECTRICAL COMPONENT FOR SENDING ASSIGNMENTS TO THE SCHEDULED MOBILE DEVICES
2416
MEMORY

FIG. 24

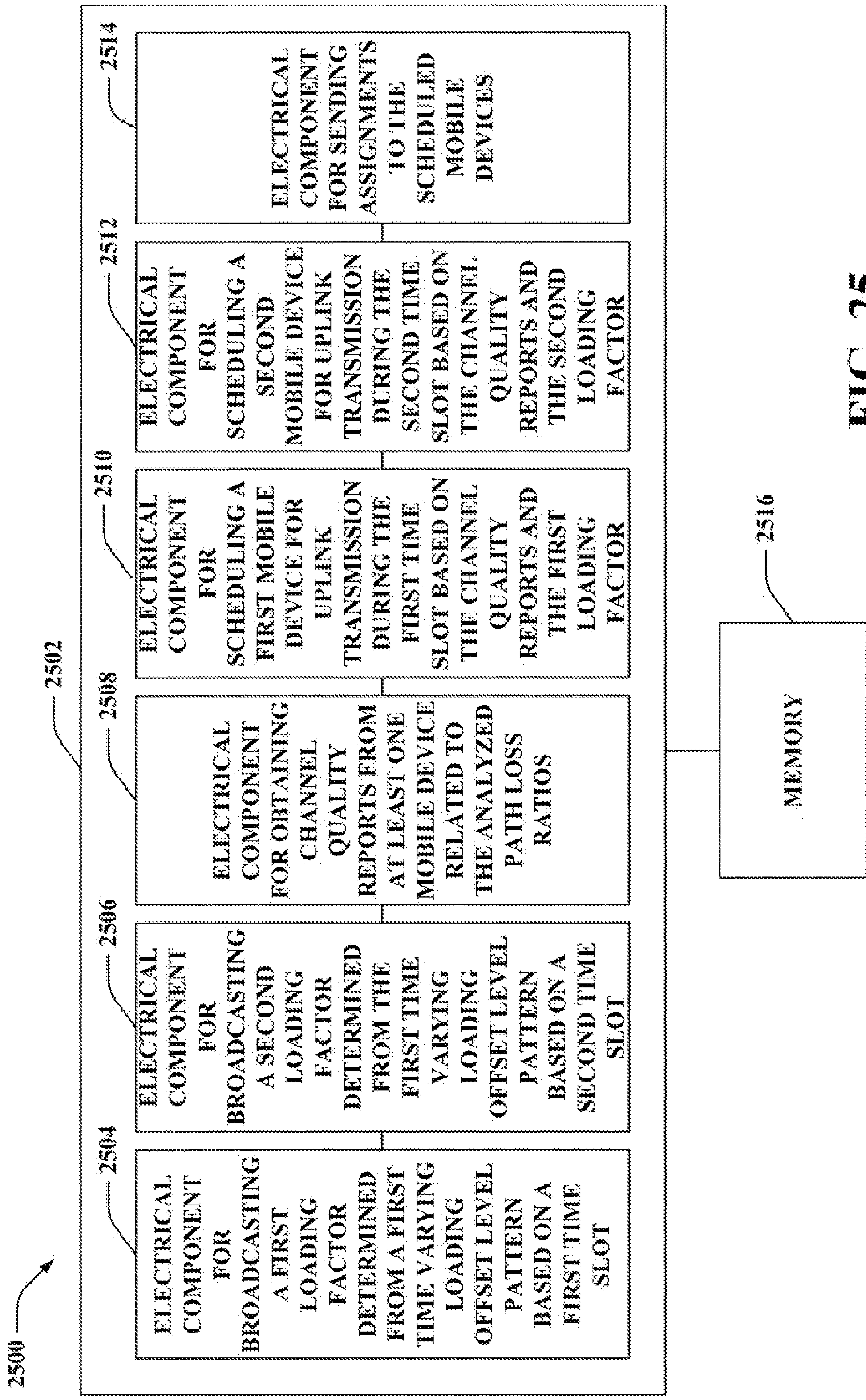

2500
2502
2504
ELECTRICAL COMPONENT FOR BROADCASTING A FIRST LOADING FACTOR DETERMINED FROM A FIRST TIME VARYING LOADING OFFSET LEVEL PATTERN BASED ON A FIRST TIME SLOT
2506
ELECTRICAL COMPONENT FOR BROADCASTING A SECOND LOADING FACTOR DETERMINED FROM THE FIRST TIME VARYING LOADING OFFSET LEVEL PATTERN BASED ON A SECOND TIME SLOT
2508
ELECTRICAL COMPONENT FOR OBTAINING CHANNEL QUALITY REPORTS FROM AT LEAST ONE MOBILE DEVICE RELATED TO THE ANALYZED PATH LOSS RATIOS
2510
ELECTRICAL COMPONENT FOR SCHEDULING A FIRST MOBILE DEVICE FOR UPLINK TRANSMISSION DURING THE FIRST TIME SLOT BASED ON THE CHANNEL QUALITY REPORTS AND THE FIRST LOADING FACTOR
2512
ELECTRICAL COMPONENT FOR SCHEDULING A SECOND MOBILE DEVICE FOR UPLINK TRANSMISSION DURING THE SECOND TIME SLOT BASED ON THE CHANNEL QUALITY REPORTS AND THE SECOND LOADING FACTOR
2514
ELECTRICAL COMPONENT FOR SENDING ASSIGNMENTS TO THE SCHEDULED MOBILE DEVICES
2516
MEMORY

FIG. 25

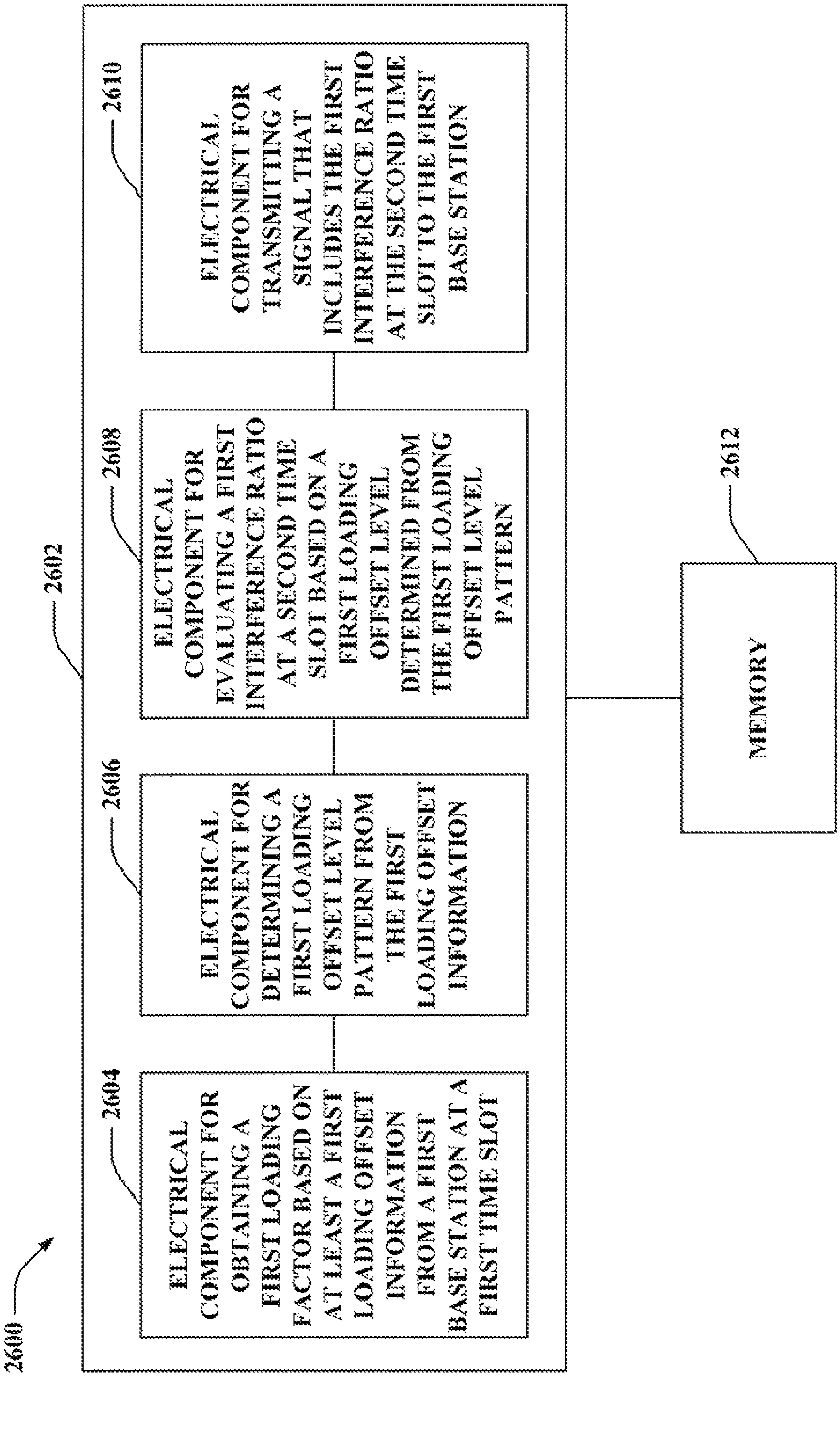

2600
2602
2604
ELECTRICAL COMPONENT FOR OBTAINING A FIRST LOADING FACTOR BASED ON AT LEAST A FIRST LOADING OFFSET INFORMATION FROM A FIRST BASE STATION AT A FIRST TIME SLOT
2606
ELECTRICAL COMPONENT FOR DETERMINING A FIRST LOADING OFFSET LEVEL PATTERN FROM THE FIRST LOADING OFFSET INFORMATION
2608
ELECTRICAL COMPONENT FOR EVALUATING A FIRST INTERFERENCE RATIO AT A SECOND TIME SLOT BASED ON A FIRST LOADING OFFSET LEVEL DETERMINED FROM THE FIRST LOADING OFFSET LEVEL PATTERN
2610
ELECTRICAL COMPONENT FOR TRANSMITTING A SIGNAL THAT INCLUDES THE FIRST INTERFERENCE RATIO AT THE SECOND TIME SLOT TO THE FIRST BASE STATION
2612
MEMORY

FIG. 26

OPPORTUNISTIC UPLINK SCHEDULING

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is related to co-pending U.S. patent application Ser. No. 11/943,489 entitled "OPPORTUNISTIC UPLINK SCHEDULING," filed Nov. 20, 2007, co-pending U.S. patent application Ser. No. 11/943,504, entitled "OPPORTUNISTIC UPLINK SCHEDULING," filed Nov. 20, 2007, and co-pending U.S. patent application Ser. No. 11/943,512, entitled "OPPORTUNISTIC UPLINK SCHEDULING," filed Nov. 20, 2007, assigned to the assignee hereof, and expressly incorporated by reference herein.

BACKGROUND

I. Field

The following description relates generally to wireless communications, and more particularly to uplink scheduling in wireless communication systems.

II. Background

Wireless communication systems are widely deployed to provide various types of communication; for instance, voice and/or data can be provided via such wireless communication systems. A typical wireless communication system, or network, can provide multiple users access to one or more shared resources. For instance, a system can use a variety of multiple access techniques such as Frequency Division Multiplexing (FDM), Time Division Multiplexing (TDM), Code Division Multiplexing (CDM), Orthogonal Frequency Division Multiplexing (OFDM), and others.

Common wireless communication systems employ one or more base stations that provide a coverage area. A typical base station can transmit multiple data streams for broadcast, multicast and/or unicast services, wherein a data stream can be a stream of data that can be of independent reception interest to a mobile device. A mobile device within the coverage area of such base station can be employed to receive one, more than one, or all the data streams carried by the composite stream. Likewise, a mobile device can transmit data to the base station or another mobile device.

Generally, wireless multiple-access communication systems can simultaneously support communication for multiple mobile devices. Each mobile device can communicate with one or more base stations via transmissions on forward and reverse links. The forward link (or downlink) refers to the communication link from base stations to mobile devices, and the reverse link (or uplink) refers to the communication link from mobile devices to base stations.

Wireless communication systems oftentimes schedule downlink and uplink transmissions. As an example, base stations commonly assign channels, times, frequencies, and so forth for mobile devices to utilize for communicating over the uplink. Conventional uplink scheduling schemes are typically based upon power control algorithms. The goal of such algorithms can be to achieve sustainable transmit rates for all users in the system. For CDMA systems, the targeted rates for different users can usually be chosen to be substantially similar to one another; thus, the transmit power of each mobile device can be controlled such that the received signal-to-interference-and-noise ratio (SINR) exceeds a certain threshold. Such strategy can be more beneficial for utilization with voice-user oriented networks. For data networks, a framework that extends the power control algorithms to a more general rate-control framework can be employed where each user can target a different rate as long as the rate-vector is within a capacity region. Under this algorithm, the system can converge to a rate vector within the capacity region that can maximize a given utility function. However, the targeted rate vector remains sustainable in that every user transmits at every time and the algorithm leads to an equilibrium where every mobile transmits at a certain rate. Due to the existence of inter and intra cell interference, sustainable rates can introduce inefficiencies since such sustainable rates may not be the optimal achievable rates for the users.

SUMMARY

The following presents a simplified summary of one or more embodiments in order to provide a basic understanding of such embodiments. This summary is not an extensive overview of all contemplated embodiments, and is intended to neither identify key or critical elements of all embodiments nor delineate the scope of any or all embodiments. Its sole purpose is to present some concepts of one or more embodiments in a simplified form as a prelude to the more detailed description that is presented later.

In accordance with one or more embodiments and corresponding disclosure thereof, various aspects are described in connection with facilitating scheduling of uplink transmissions. For instance, a time sharing scheme can be utilized such that differing mobile devices can be scheduled to transmit during differing time slots; however, it is also contemplated that a static scheme can be employed. Pursuant to an illustration, an interference budget can be combined with a time varying weighting factor associated with a base station; the weighting factor can be predefined and/or adaptively adjusted (e.g., based upon a load balancing mechanism). Moreover, the weighted interference budget can be leveraged for selecting mobile devices for uplink transmission (e.g., based at least in part upon path loss ratios of the mobile devices). By way of a further illustration, disparate interference budgets can be utilized for differing channels of a sector at a particular time, and the disparate interference budgets can be employed for uplink scheduling upon the respective channels. According to another example, a base station can assign a loading factor to be utilized by wireless terminal(s) for generating channel quality report(s) (e.g., the loading factor is leveraged by wireless terminal(s) to determine path loss ratio(s)). The assigned loading factor can be static or dynamic. Further, the base station can obtain the channel quality report(s) and thereafter select mobile devices for uplink transmission.

According to related aspects, a method that facilitates scheduling uplink transmissions in a communication network including a first base station that includes a first sector utilizing a dynamic loading offset level pattern is described herein. The method can include broadcasting a first loading factor based on a first loading offset level determined from a first time varying loading offset level pattern corresponding to a first time slot. Further, the method can comprise broadcasting a second loading factor based on a first loading offset level determined from the first time varying loading offset level pattern corresponding to a second time slot, the first loading offset level differs from the second loading offset level by at least 0.5 dB. Moreover, the method can include receiving channel quality reports from one or more mobile devices pertaining to evaluated path loss ratios during the first time slot and the second time slot. The method can also include scheduling a first mobile device for uplink transmission during the first time slot on a first channel based on the channel quality reports and the first loading factor. Additionally, the method can comprise scheduling a second mobile device for

uplink transmission during the second time slot on the first channel based on the channel quality reports and the second loading factor. Moreover, the method can include transmitting assignments to the first mobile device and the second mobile device related to the scheduled uplink transmissions.

Another aspect relates to a wireless communications apparatus. The wireless communications apparatus can include a memory that retains instructions related to broadcasting a first loading factor based on a first loading offset level determined from a first time varying loading offset level pattern corresponding to a first time slot, broadcasting a second loading factor based on a second loading offset level determined from the first time varying loading offset level pattern corresponding to a second time slot, the first loading offset level differs from the second loading offset level by at least 0.5 dB, receiving channel quality reports from one or more mobile devices pertaining to evaluated path loss ratios during the first time slot and the second time slot, scheduling a first mobile device for uplink transmission during the first time slot on a first channel based on the channel quality reports and the first loading factor, scheduling a second mobile device for uplink transmission during the second time slot on the first channel based on the channel quality reports and the second loading factor, and sending assignments to the first mobile device and the second mobile device related to the scheduled uplink transmissions. Further, the wireless communications apparatus can include a processor, coupled to the memory, configured to execute the instructions retained in the memory.

Yet another aspect relates to a wireless communications apparatus that enables scheduling uplink transmissions by utilizing a dynamic loading offset level pattern. The wireless communications apparatus can include means for broadcasting a first loading factor based on a first loading offset level determined from a first time varying loading offset level pattern based on a first time slot. Further, the wireless communications apparatus can comprise means for broadcasting a second loading factor based on a second loading offset level determined from the first time varying loading offset level pattern based on a second time slot. Moreover, the wireless communications apparatus can include means for obtaining channel quality reports from at least one mobile device related to analyzed path loss ratios. Additionally, the wireless communications apparatus can comprise means for scheduling a first mobile device for uplink transmission during the first time slot based on the channel quality reports and the first loading factor. Further, the wireless communications apparatus can include means for scheduling a second mobile device for uplink transmission during the second time slot based on the channel quality reports and the second loading factor. Moreover, the wireless communications apparatus can include means for sending assignments to the scheduled mobile devices.

Still another aspect relates to a machine-readable medium having stored thereon machine-executable instructions for broadcasting a first loading factor based on a first loading offset level and a second loading factor based on a second loading offset level identified from a first time varying loading offset level pattern, the first loading factor corresponding to a first time slot and the second loading factor corresponding to a second time slot; receiving channel quality reports from at least one mobile device related path loss ratios generated based upon the first loading factor and the second loading factor; and scheduling a first mobile device for uplink transmission during the first time slot and a second mobile device for uplink transmission during the second time slot based upon the channel quality reports.

In accordance with another aspect, an apparatus in a wireless communication system can include a processor, wherein the processor can be configured to broadcast a first loading factor based on a first loading offset level and a second loading factor based on a second loading offset level identified from a first time varying loading offset level pattern, the first loading factor corresponding to a first time slot and the second loading factor corresponding to a second time slot. Further, the processor can be configured to obtain channel quality reports from at least one mobile device related path loss ratios generated based upon the first loading factor and the second loading factor. Moreover, the processor can be configured to schedule a first mobile device for uplink transmission during the first time slot and a second mobile device for uplink transmission during the second time slot based upon the channel quality reports.

According to other aspects, a method of operating a wireless mobile device in an environment that utilizes a dynamic loading offset level pattern is described herein. The method can include receiving a first loading factor based on at least a first loading offset information from a first base station at a first time slot. Further, the method can include determining a first loading offset level pattern from the first loading offset information. Moreover, the method can comprise determining a first interference ratio at a second time slot based on at least a first loading offset level determined by the first loading offset level pattern. Additionally, the method can include sending a first signal that includes the first interference ratio at the second time slot to the first base station.

Yet another aspect relates to a wireless communications apparatus that can include a memory that retains instructions related to obtaining a first loading factor based on at least a first loading offset information from a first base station during a first time slot, deciphering a first loading offset level pattern based upon the first loading offset information, generating a first interference ratio during a second time slot based on a first loading offset level recognized based upon the first loading offset level pattern, and transmitting a first signal that includes the first interference ratio during the second time slot to the first base station. Further, the wireless communications apparatus can comprise a processor, coupled to the memory, configured to execute the instructions retained in the memory.

Another aspect relates to a wireless communications apparatus that enables evaluating an interference ratio based upon a dynamic loading offset level pattern. The wireless communications apparatus can include means for obtaining a first loading factor based on at least a first loading offset information from a first base station at a first time slot. Further, the wireless communications apparatus can comprise means for determining a first loading offset level pattern from the first loading offset information. Moreover, the wireless communications apparatus can include means for evaluating a first interference ratio at a second time slot based on a first loading offset level determined from the first loading offset level pattern. Additionally, the wireless communications apparatus can include means for transmitting a first signal that includes the first interference ratio at the second time slot to the first base station.

Still another aspect relates to a machine-readable medium having stored thereon machine-executable instructions for obtaining a first loading factor based on at least a first loading offset information from a first base station at a first time slot, determining a first loading offset level pattern from the first loading offset information by employing at least one of a lookup table or a predetermined function, evaluating a first interference ratio at a second time slot based on a first loading offset level determined from the first loading offset level pattern, and transmitting a first signal that includes the first interference ratio at the second time slot to the first base station.

In accordance with another aspect, an apparatus in a wireless communication system can include a processor, wherein the processor can be configured to receive a first loading factor based on at least a first loading offset information from a first base station at a first time slot; determine a first loading offset level pattern from the first loading offset information; determine a first interference ratio at a second time slot based on at least a first loading offset level determined by the first loading offset level pattern; and/or send a first signal that includes the first interference ratio at the second time slot to the first base station.

To the accomplishment of the foregoing and related ends, the one or more embodiments comprise the features hereinafter fully described and particularly pointed out in the claims. The following description and the annexed drawings set forth in detail certain illustrative aspects of the one or more embodiments. These aspects are indicative, however, of but a few of the various ways in which the principles of various embodiments may be employed and the described embodiments are intended to include all such aspects and their equivalents.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an illustration of a wireless communication system in accordance with various aspects set forth herein.

FIG. **2** is an illustration of an example system that schedules uplink transmissions based at least in part upon an interference budget.

FIG. **3** is an illustration of an example system that includes multiple cells that can utilize respective time varying interference budgets.

FIG. **4** is an illustration of an example weighting diagram for varying interference budgets as a function of time.

FIG. **5** is an illustration of an example system that adaptively adjusts interference budget weighting based upon load for time varying uplink scheduling.

FIG. **6** is an illustration of an example sector-wise reuse multi-cell deployment in accordance with various aspects of the claimed subject matter.

FIG. **7** is an illustration of an example cell-wise reuse deployment of multiple cells for an interference budget reuse scheme.

FIG. **8** is an illustration of an example system that schedules uplink transmissions based upon channel quality report(s) obtained from mobile device(s) generated as a function of assigned loading factor(s).

FIG. **9** is an illustration of an example diagram depicting time varying loading factors.

FIG. **10** is an illustration of an example sector-wise reuse multi-cell deployment in accordance with various aspects of the claimed subject matter.

FIG. **11** is an illustration of an example cell-wise reuse deployment of multiple cells for a loading factor reuse scheme.

FIG. **12** is an illustration of an example methodology that facilitates scheduling uplink transmission based upon a consideration of time.

FIG. **13** is an illustration of an example methodology that facilitates altering a time variation of a weighted interference budget to enable load balancing.

FIG. **14** is an illustration of an example methodology that facilitates scheduling uplink transmissions in a communication network including a first base station that includes a first sector utilizing a static interference budget with multi-carriers.

FIG. **15** is an illustration of an example methodology that facilitates scheduling uplink transmissions in a communication network including a first base station that includes a first sector employing a dynamic interference budget.

FIG. **16** is an illustration of an example methodology that facilitates scheduling uplink transmissions in a communication network including a first base station that includes a first sector employing static loading offset levels.

FIG. **17** is an illustration of an example methodology that facilitates scheduling uplink transmissions in a communication network including a first base station that includes a first sector utilizing dynamic loading offset level pattern(s).

FIG. **18** is an illustration of an example methodology that facilitates operating a wireless mobile device in an environment that utilizes a dynamic loading offset level pattern.

FIG. **19** is an illustration of an example communication system implemented in accordance with various aspects including multiple cells.

FIG. **20** is an illustration of an example base station in accordance with various aspects.

FIG. **21** is an illustration of an example wireless terminal (e.g., mobile device, end node, . . .) implemented in accordance with various aspects described herein.

FIG. **22** is an illustration of an example system that enables scheduling uplink transmissions by utilizing a static interference budget in a multi-carrier environment.

FIG. **23** is an illustration of an example system that enables scheduling uplink transmissions by utilizing a dynamic interference budget.

FIG. **24** is an illustration of an example system that enables scheduling uplink transmissions by utilizing a static loading offset level.

FIG. **25** is an illustration of an example system that enables scheduling uplink transmissions by utilizing a dynamic loading offset level pattern.

FIG. **26** is an illustration of an example system that enables evaluating an interference ratio based upon a dynamic loading offset level pattern.

DETAILED DESCRIPTION

Various embodiments are now described with reference to the drawings, wherein like reference numerals are used to refer to like elements throughout. In the following description, for purposes of explanation, numerous specific details are set forth in order to provide a thorough understanding of one or more embodiments. It may be evident, however, that such embodiment(s) may be practiced without these specific details. In other instances, well-known structures and devices are shown in block diagram form in order to facilitate describing one or more embodiments.

As used in this application, the terms “component,” “module,” “system,” and the like are intended to refer to a computer-related entity, either hardware, firmware, a combination of hardware and software, software, or software in execution. For example, a component may be, but is not limited to being, a process running on a processor, a processor, an object, an executable, a thread of execution, a program, and/or a computer. By way of illustration, both an application running on a computing device and the computing device can be a component. One or more components can reside within a process and/or thread of execution and a component may be localized on one computer and/or distributed between two or more computers. In addition, these components can execute from various computer readable media having various data structures stored thereon. The components may communicate by way of local and/or remote processes such as in accordance with a signal having one or more data packets (e.g., data from one component interacting with another component in a local system, distributed system, and/or across a network such as the Internet with other systems by way of the signal).

Furthermore, various embodiments are described herein in connection with a wireless terminal. A wireless terminal can also be called a system, subscriber unit, subscriber station, mobile station, mobile, mobile device, remote station, remote terminal, access terminal, user terminal, terminal, wireless communication device, user agent, user device, or user equipment (UE). A wireless terminal may be a cellular telephone, a cordless telephone, a Session Initiation Protocol (SIP) phone, a wireless local loop (WLL) station, a personal digital assistant (PDA), a handheld device having wireless connection capability, computing device, or other processing device connected to a wireless modem. Moreover, various embodiments are described herein in connection with a base station. A base station may be utilized for communicating with wireless terminal(s) and may also be referred to as an access point, Node B, or some other terminology.

Moreover, various aspects or features described herein may be implemented as a method, apparatus, or article of manufacture using standard programming and/or engineering techniques. The term "article of manufacture" as used herein is intended to encompass a computer program accessible from any computer-readable device, carrier, or media. For example, computer-readable media can include but are not limited to magnetic storage devices (e.g., hard disk, floppy disk, magnetic strips, etc.), optical disks (e.g., compact disk (CD), digital versatile disk (DVD), etc.), smart cards, and flash memory devices (e.g., EPROM, card, stick, key drive, etc.). Additionally, various storage media described herein can represent one or more devices and/or other machine-readable media for storing information. The term "machine-readable medium" can include, without being limited to, wireless channels and various other media capable of storing, containing, and/or carrying instruction(s) and/or data.

Referring now to FIG. **1**, a wireless communication system **100** is illustrated in accordance with various embodiments presented herein. System **100** can comprise one or more base stations **102** (e.g., access points) in one or more sectors that receive, transmit, repeat, etc., wireless communication signals to each other and/or to one or more mobile devices **104**. Each base station **102** can comprise a transmitter chain and a receiver chain, each of which can in turn comprise a plurality of components associated with signal transmission and reception (e.g., processors, modulators, multiplexers, demodulators, demultiplexers, antennas, . . .) as will be appreciated by one skilled in the art. Mobile devices **104** can be, for example, cellular phones, smart phones, laptops, handheld communication devices, handheld computing devices, satellite radios, global positioning systems, PDAs, and/or any other suitable device for communicating over wireless communication system **100**. Base stations **102** can each communicate with one or more mobile devices **104**. Base stations **102** can transmit information to mobile devices **104** over a forward link (downlink) and receive information from mobile devices **104** over a reverse link (uplink).

System **100** can support differing types of users such as close-to-base station users (e.g., one or more mobile devices **104**) and cell-boundary users (e.g., one or more mobile devices **104**). For example, inter-cell interference (e.g., interference generated by a mobile device at non-serving base station(s)) yielded by a mobile device **104** can be similar to signal strength observed at a serving base station when cell-boundary users transmit upon the uplink. Further, close-to-base station users can generate a lesser amount of inter-cell interference.

Moreover, system **100** can enable time sharing between mobile devices **104**; thus, different mobile devices **104** can transmit on the uplink during differing time slots. Time sharing can be effectuated by base station **102** scheduling uplink transmission, for instance. Base station **102** can utilize an interference budget in connection with uplink scheduling. Further, the interference budget can be time varying (or weighted by a time varying factor). Additionally, the interference budget can be a function of an identity of a cell (e.g., interference budgets can differ between cells during a particular time slot). Pursuant to another illustration, the interference budget can vary between sectors. Uplink scheduling can be effectuated such that when the interference budget is good, cell-boundary users can be scheduled, and when the interference budget is bad, the close-to-base station users can be scheduled. According to another example, base station **102** can provide a loading factor to be employed by mobile devices **104** for generating channel quality reports. The loading factor can be dynamic (e.g., time varying) or static (e.g., each sector and/or cell can employ a respective loading factor that need not change as a function of time). Thereafter, base station **102** can obtain the channel quality reports and schedule uplink transmission based upon such reports.

Accordingly, the scheme employed in connection with system **100** can provide benefits by mitigating interference seen by cell-boundary users as compared to an amount of inter-cell interference commonly observed with cell-boundary users in conventional systems that leverage power-control based algorithms. Additionally, close-to-base station users can be scheduled with higher transmit power to compensate for higher interference observed while utilizing the time varying interference budget based scheme as compared to power-control based schemes since the users need not be power limited. Further, close-to-base station users can be scheduled more frequently when employing the time varying interference budget based scheme supported by system **100**.

Turning to FIG. **2**, illustrated is a system **200** that schedules uplink transmissions based at least in part upon an interference budget. For instance, the interference budget can be dynamic (e.g., time varying) or static. According to another example, differing interference budgets can be utilized for scheduling uplink transmission upon disparate uplink channels; these differing interference budgets can be dynamic and/or static. System **200** includes a base station **202** that can serve one or more mobile devices (e.g., mobile device 1 **204**, . . . , mobile device N **206**, where N can be substantially any integer); accordingly, links can be established between base station **202** and mobile devices **204**-**206**. Each mobile device **204**-**206** can communicate with base station **202** (and/or disparate base station(s)) on downlink and/or uplink channel(s) at any given moment. The downlink refers to the communication link from base station **202** to mobile devices **204**-**206**, and the uplink channel refers to the communication link from mobile devices **204**-**206** to base station **202**. Base station **202** can further communicate with other base station(s) and/or any disparate devices (e.g., servers) (not shown) that can perform functions such as, for example, authentication and authorization of mobile devices **204**-**206**, accounting, billing, and so forth.

Base station **202** can include an opportunistic uplink scheduler **208** that generates assignments for uplink transmissions from mobile devices **204**-**206** to base station **202**. Opportunistic uplink scheduler **208** can allocate resources to be utilized by mobile devices **204-206**. For example, at a particular time, opportunistic uplink scheduler **208** can allot an uplink channel (and/or a plurality of uplink channels) to be utilized by a particular mobile device (e.g., mobile device **1 204**, . . .); meanwhile, a disparate mobile device (e.g., mobile device N **206**, . . .) can be scheduled by opportunistic uplink scheduler **208** at a differing time (however, the claimed subject matter is not so limited). Opportunistic uplink scheduler **208** can transfer assignments to respective mobile devices **204-206**, for example. It is contemplated that the assignments yielded by opportunistic uplink scheduler **208** can provide information related to time (e.g., time slot, duration, . . .), channel, frequency (e.g., tone(s)), power level, rate, and the like to be employed for uplink communication.

Opportunistic uplink scheduler **208** can include an interference budgeter **210** and a user selector **212**. Opportunistic uplink scheduler **208** can employ a scheme that leverages the non-convexity nature of a sustainable rate region. For instance, rates can be assigned by opportunistic uplink scheduler **208** according to the following criterion:

$$\sum_{i:c(i)=k} N_i \alpha_i \gamma_i \leq l_k w_k$$

where N_i is the number of tones used by user i, α_i is the spillage (or path loss ratio) and γ_i is the targeted SNR of user i. Additionally, $l_k w_k$ is the weighted interference budget of cell k (e.g., l_k is the interference budget of cell k and w_k is the weighting of cell k). The interference budget sets forth a total interference level not to be exceeded by user(s) employing uplink channel(s) associated with a particular cell (and/or sector). Further, the interference budget is leveraged by opportunistic uplink scheduler **208** when selecting user(s) to schedule for uplink transmission. Interference budgeter **210** can vary the weighted interference budget across time. For instance, interference budgeter **210** can employ a time variation curve that can weight the interference budget. Following this illustration, the time variation curve can be predefined and/or adaptive according to a load balancing mechanism. By way of example, l_k's can be weighted by interference budgeter **210** in a manner such that a good interference budget can be yielded when neighboring cell(s) have relatively bad interference budgets. Thus, interference budgeters of disparate base stations (not shown) similar to interference budgeter **210** can enable a plurality of cells to coordinate time variation of the respective interference budgets associated with each of the cells; hence, the interference budgets of the plurality of cells can complement one another over time.

Moreover, user selector **212** can schedule particular mobile devices **204-206** for uplink transmission based upon the time varying interference budget yielded by interference budgeter **210**. User selector **212** can choose a particular mobile device (e.g., mobile device **1 204**, . . .) from amongst the set of mobile devices **204-206** to assign to an uplink traffic channel during a time slot as a function of the time varying interference budget. User selector **212** can schedule cell-boundary users (e.g., mobile device(s) **204-206** located further from base station **202**) when the interference budget is good and close-to-base station users (e.g., mobile device(s) **204-206** located proximate to the base station **202**) when the interference budget is bad. Hence, cell-boundary users can experience decreased interference as compared to similar users employing power-control based algorithms since such users in disparate cells can be scheduled at differing times for uplink transmission.

According to another example, interference budgeter **210** can allocate a first interference budget for uplink scheduling upon a first channel and a second interference budget for uplink scheduling upon a second channel. For instance, the first interference budget and the second interference budget can be static and/or dynamic. Although two interference budgets and two channels are described herein, it is contemplate that any number of channels can be allotted any number of respective interference budgets for uplink scheduling. Thus, for instance, user selector **212** can schedule a cell-boundary user upon a first channel with a good interference budget and a close-to-base station user upon a second channel with a bad interference budget.

Now referring to FIG. **3**, illustrated is an example system **300** that includes multiple cells that can utilize respective time varying interference budgets. System **300** includes a first cell associated with a first base station **302** and a second cell associated with a second base station **304**. Although system **300** is depicted to comprise two base stations and two cells, the claimed subject matter contemplates employing any number of base stations and cells. Further, according to the illustrated example, each base station **302-304** can serve a respective cell-boundary mobile device (e.g., base station **302** can serve mobile device **306** and base station **304** can serve mobile device **308**) and a respective close-to-base station mobile device (e.g., base station **302** can serve mobile device **310** and base station **304** can serve mobile device **312**); however, it is to be appreciated that any number of mobile devices can be served by each base station **302-304** and/or mobile devices can be located at any positions within cells.

Due to the existence of inter and intra cell interference, sustainable rates typically utilized in conventional systems might not provide optimal achievable rates for the users. According to an illustration where two adjacent cells each include a respective cell-boundary mobile device (e.g., cell-boundary mobile devices **306-308**), the interference generated by each of these mobile devices to the non-serving base station can be substantially similar to the signal strength to their respective serving base station. Moreover, due to the symmetry of mobiles, conventionally techniques employing sustainable rates oftentimes allow these cell-boundary mobile devices to transmit at full power and the resulting rate vector can consist of two identical entries which correspond to the rates achieved at zero SINR.

In contrast, system **300** enables time sharing between mobiles such that different mobile devices **306-312** transmit at different time slots. Pursuant to the above two-mobile two-base station example, time slots for transmission for each cell-boundary mobile devices **306-308** can be alternated. By time sharing, mobile devices **306-308** can transmit less frequently; however, SINR gains can compensate for the loss in degrees of freedom and thus benefit both mobile devices **306-308**. Thus, improvement can be obtained by removing the sustainable condition on the rates typically associated with conventional techniques.

Moreover, in connection with scheduling uplink transmissions, path loss ratios can be determined for mobile devices **306-312** (e.g., mobile devices **306-312** can each generate respective channel quality reports pertaining to their evaluated path loss ratios, and the channel quality reports can be communicated to base stations **302-304** for scheduling uplink transmissions by mobile devices **306-312**). The path loss ratio can be evaluated according to the following:

$$\alpha_i = \frac{\sum_{k \neq c(i)} h_{ik}\, load_k}{h_{ic(i)}}.$$

According, α_i is the path loss ratio of user i, h_{ik} is the path loss between the user i and cell k, $h_{ic(i)}$ is the path loss between the user i and the serving cell c(i), and $load_k$ is the loading factor assigned by cell k. For instance, the loading factor can be static or dynamic. Moreover, the path loss ratio can be greater for cell-boundary mobile devices **306-308** in comparison to close-to-base station mobile devices **310-312** (e.g., close-to-base station mobile devices **310-312** can create less interference to neighboring, non-serving base stations since their path losses can be lower).

Differences in the path loss ratios for the mobile devices **306-312** can be leveraged for uplink scheduling on the basis of the time varying interference budget. By way of illustration, the first cell associated with base station **302** can have a high interference budget and the second cell associated with base station **304** can have a low interference budget at a particular time. Further, base station **302** can schedule cell-boundary mobile device **306** for uplink transmission during this time slot, while base station **304** can refrain from scheduling cell-boundary mobile device **308** at this time; rather, close-to-base station mobile device **312** can be scheduled by base station **304** during this time slot.

Referring now to FIG. **4**, illustrated is an example weighting diagram **400** for varying interference budgets as a function of time. Diagram **400** depicts two weighting curves **402** and **404** that vary between 0.5 and 1.5 over time. Each base station (e.g., base station **202** of FIG. **2**, base stations **302-304** of FIG. **3**, . . .) in a network can be associated with a particular one of the weighting curves **402-404**. For example, base station **302** can utilize weighting curve **402** and base station **304** can employ weighting curve **404**; however, the claimed subject matter is not so limited. During each time slot, the base station can multiply an interference budget by the weight set forth in the respective weighting curve **402-404**, and the resultant value can be utilized by the base station for scheduling mobile device(s) for uplink transmissions. Further, nearby base stations can utilize differing weighting curves from the set of weighting curves.

Although two weighting curves **402-404** are shown, it is contemplated that any number of weighting curves can be utilized. Moreover, it is to be appreciated that the claimed subject matter is not limited to employing sinusoidal weighting curves; rather, any time varying patterns can be utilized (e.g., patterns need not be smooth curves). For example, any complementary weighting patterns can be used such that the sum of all weighting patterns can be constant over time. By way of illustration, time varying patterns of discrete weights can be used; however, the claimed subject matter is not so limited. Further, the claimed subject matter is not limited to employing a weight that varies between 0.5 and 1.5.

Now turning to FIG. **5**, illustrated is a system **500** that adaptively adjusts interference budget weighting based upon load for time varying uplink scheduling. System **500** includes base station **202** that can further comprise opportunistic uplink scheduler **208**, interference budgeter **210**, and user selector **212** as described above. Further, interference budgeter **210** can include a load evaluator **502** and an adaptive weighter **504**.

Load evaluator **502** can analyze loading information from disparate base station(s) and/or loading information associated with base station **202**. For instance, base station(s) can share loading information with nearby base stations to enable such analysis. According to another example, loading information from each base station can be collected by a network device (not shown), and base station **202** can thereafter retrieve such loading information. Load evaluator **502** can compare numbers of mobile devices served by each base station, path loss ratios of mobile devices served by each base station (e.g., which can relate to positions of mobile devices within cells, interference yielded by such mobile devices, . . .), and so forth. According to an illustration, load evaluator **502** can determine that base station **202** serves one hundred mobile devices while a neighboring base station serves ten mobile devices; however, the claimed subject matter is not so limited.

Adaptive weighter **504** can adjust the weighting utilized by interference budgeter **210** based upon the analyzed loading information. For instance, adaptive weighter **504** can alter the weighting in real time based upon network loading. Following the above illustration where base station **202** serves one hundred mobile devices and the neighboring base station serves ten mobile device, adaptive weighter **504** can shift a mean of the weights utilized by interference budgeter **210** higher in comparison to a mean of the weights employed by an interference budgeter of the neighboring base station; however, the claimed subject matter is not so limited as it is contemplated that any variation can be made by adaptive weighter **504** (e.g., adaptive weighter **504** can alter frequency, mean, periodicity, offset, pattern, pattern type, . . .). Moreover, according to another illustration, adaptive weighter **504** can enable altering a loading factor provided to mobile device(s) to generate path loss ratio(s) in addition to or instead of varying the weighted interference budget.

Thereafter, mobile device(s) can be chosen by user selector **212** for scheduling upon the uplink based upon the adaptive, time varying, weighted interference budget. Accordingly, assignment(s) can be yielded (e.g., transferred to respective mobile devices) in response to such selections. The assignments can include information related to time slot, duration, channel, frequency (e.g., tone(s)), power level, rate, and so forth to be utilized by a mobile device for uplink transmission.

Turning to FIG. **6**, illustrated is an example sector-wise reuse multi-cell deployment **600** in accordance with various aspects of the claimed subject matter. As depicted, the multi-cell deployment **600** can comprise multiple cells **602** dispersed over a geographic area to form a communication network. Each of the cells **602** can include three sectors as shown; however, it is contemplated that one or more of the cells **602** can include fewer than and/or greater than three sectors. Further, it is to be appreciated that the multi-cell deployment **600** can support multiple carriers and/or a single carrier.

The sectorized cells **602** can be located in a regular hexagon grid and can extend beyond the grid depicted (e.g., any number of cells **602** can be included in the grid, . . .). For each of the sectors of the cells **602**, an interference budget (e.g., I**1**, I**2**, I**3**, . . .) can be chosen. For instance, the interference budgets can be weighted and can vary as a function of time. Pursuant to another illustration, the interference budgets can be static. Further, the interference budgets can be reused across all of the sectors. According to the illustrated example, three distinct interference budgets can respectively be allocated to each of the three sectors of each of the cells **602**; thus, sector **1** can be allocated interference budget **1** (I**1**), sector **2** can be allocated interference budget **2** (P**2**), and sector **3** can be allocated interference budget **3** (P**3**). Moreover, the same pattern can be reused across all of the cells **602**.

Additionally, pursuant to an illustration where multiple carriers are supported for uplink communication in each sector, each sector can utilize a set of interference budgets. Further, each interference budget in the set can correspond to a particular carrier (e.g., the set can include a first interference budget that relates to a first carrier and a second interference budget that relates to a second carrier utilized in a particular sector, . . .). Thus, I1, I2, and I3 as shown in the deployment **600** can represent three distinct sets of interference budgets.

FIG. **7** illustrates an example cell-wise reuse deployment **700** of multiple cells for an interference budget reuse scheme. A plurality of cells **702**, **704**, **706** are included within the grid associated with the deployment **700**. As shown, the cells **702-706** include three sectors; however, the claimed subject matter is not limited to utilization of cells with three sectors. The deployment **700** can be employed when leakages from intra-cell sectors are significant. In particular, the deployment **700** can use a substantially similar interference budget (or set of interference budgets that each correspond to a particular carrier in a multi-carrier scenario) for sectors inside the same cell and different interference budgets (or sets of interference budgets) across different cells. Thus, according to the depicted example, cells **702** can include three sectors that utilize interference budget **1** (I**1**) (or set of interference budgets I**1**), cells **704** can include three sectors that employ interference budget **2** (I**2**) (or set of interference budgets I**2**), and cells **706** can include three sectors that use interference budget **3** (I**3**) (or set of interference budgets I**3**). Further, each cell **702** can be adjacent to cell(s) **704** and/or cell(s) **706** (and cells **704** and cells **706** can similarly be adjacent to differing types of cells), and therefore, adjacent cells can utilize differing interference budgets (e.g., a cell **702** is not directly adjacent to another cell **702**). It is contemplated, however, that any number of differing interference budgets (or sets of interference budgets) can be employed by different cells, and thus, the claimed subject matter is not limited to the illustrated example.

Now turning to FIG. **8**, illustrated is a system **800** that schedules uplink transmissions based upon channel quality report(s) obtained from mobile device(s) generated as a function of assigned loading factor(s). System **800** includes base station **202** that communicates with mobile devices **204-206**. Base station **202** comprises opportunistic uplink scheduler **208**, which can further include a load assigner **802** and user selector **212**. Moreover, each mobile device **204-206** can include a respective channel quality evaluator **804-806** (e.g., mobile device **1 204** includes channel quality evaluator **1 804**, . . . , mobile device N **206** includes channel quality evaluator N **806**).

Load assigner **802** identifies a loading factor to be utilized by mobile devices **204-206** in connection with determining respective path loss ratios of mobile devices **204-206**. The loading factor can be a function of a loading status (e.g., number of users) of base station **202** (or a sector of base station **202**), for instance. For example, the loading factor selected by load assigner **802** can be determined as a function of time (e.g., dynamic). By way of another illustration, the loading factor identified by load assigner **802** can be static (e.g., preset based upon an identity of a sector, a cell, etc.). Further, load assigner **802** enables communicating the loading factor to mobile devices **204-206**; for instance, load assigner **802** can effectuate broadcasting the loading factor to mobile devices **204-206**. By way of another illustration, load assigner **802** can identify and communicate a plurality of loading factors, and each of the loading factors can be utilized by mobile devices **204-206** to evaluate path loss ratios corresponding to respective carriers.

Mobile devices **204-206** obtain the loading factor(s) from base station **202**. Thereafter, channel quality evaluators **804-806** determine respective path loss ratios for mobile devices **204-206** as a function of the received loading factor(s). The path loss ratios can be analyzed according to

$$\alpha_i = \frac{\sum_{k \neq c(i)} h_{ik} load_k}{h_{ic(i)}},$$

where α_i is the path loss ratio of user i, h_{ik} is the path loss between the user i and cell k, $h_{ic(i)}$, is the path loss between the user i and the serving cell c(i), and $load_k$ is the loading factor assigned by cell k. Channel quality evaluators **804-806** can yield channel quality reports that include information associated with the analyzed path loss ratios (e.g., an interference ratio in a channel between a signal strength from a serving base station to the mobile device and a weighted sum of signal strengths from interfering sectors where the weight is a function of the loading factor). Moreover, channel quality evaluators **804-806** can enable transmitting the channel quality reports to base station **202**.

Base station **202** receives the channel quality reports from mobile devices **204-206**. Opportunistic uplink scheduler **208** (and/or user selector **212**) can schedule one or more mobile devices **204-206** for uplink transmission based upon the channel quality reports. Moreover, opportunistic uplink scheduler **208** can transmit an assignment to the scheduled mobile device(s) **204-206** related to the scheduled uplink transmission. For instance, the assignment can include a maximum interference budget allocated to the scheduled mobile device(s) **204-206** for uplink transmission.

With reference to FIG. **9**, illustrated is an example diagram **900** depicting time varying loading factors. Diagram **900** includes two loading factor curves **902** and **904** that can be utilized by disparate base stations, cells, sectors, etc. in a network. For example, a first sector can employ loading factor curve **902** and a second sector can utilize loading factor curve **904** for selecting respective loading factors to assign to mobile devices for generating channel quality reports; however, the claimed subject matter is not so limited. Further, nearby base stations, cells, sectors, etc. can utilize differing loading factor curves. Although two loading factor curves **902-904** are shown, it is contemplated that any number of loading factor curves can be employed. Moreover, it is contemplated that the claimed subject matter is not limited to employing sinusoidal loading factor curves; rather, any time varying patterns can be utilized (e.g., patterns need not be smooth curves, patterns can include discrete loading factor values, . . .). Additionally, loading factor curves associated with differing base stations, cells, sectors, etc. need not have substantially similar frequencies, amplitudes, etc. as shown; instead, loading factor curves can have differing frequencies, amplitudes, and the like. Also, any time shift between loading factor curves can be employed.

Turning to FIG. **10**, illustrated is an example sector-wise reuse multi-cell deployment **1000** in accordance with various aspects of the claimed subject matter. As depicted, the multi-cell deployment **1000** can comprise multiple cells **1002** dispersed over a geographic area to form a communication network. Each of the cells **1002** can include three sectors as shown; however, it is contemplated that one or more of the cells **1002** can include fewer than and/or greater than three sectors. Further, it is to be appreciated that the multi-cell deployment **1000** can support multiple carriers and/or a single carrier. The sectorized cells **1002** can be located in a regular hexagon grid and can extend beyond the grid depicted (e.g., any number of cells **1002** can be included in the grid, . . .). For each of the sectors of the cells **1002**, a loading factor (e.g., LF**1**, LF**2**, LF**3**, . . .) can be chosen. For instance, the loading factors can vary as a function of time (e.g., a time varying loading factor pattern can be employed). Pursuant to another illustration, the loading factors can be static. Further, the loading factors can be reused across all of the sectors. According to the illustrated example, three distinct loading factors can respectively be allocated to each of the three sectors of each of the cells **1002**; thus, sector **1** can be allocated loading factor **1** (LF**1**), sector **2** can be allocated loading factor **2** (LF**2**), and sector **3** can be allocated loading factor **3** (LF**3**). Moreover, the same pattern can be reused across all of the cells **1002**.

Additionally, pursuant to an illustration where multiple carriers are supported for uplink communication in each sector, each sector can utilize a set of loading factors. Further, each loading factor in the set can correspond to a particular carrier (e.g., the set can include a first loading factor that relates to a first carrier and a second loading factor that relates to a second carrier utilized in a particular sector, . . .). Thus, LF**1**, LF**2**, and LF**3** as shown in the deployment **1000** can represent three distinct sets of loading factors.

FIG. **11** illustrates an example cell-wise reuse deployment **1100** of multiple cells for a loading factor reuse scheme. A plurality of cells **1102**, **1104**, **1106** are included within the grid associated with the deployment **1100**. As shown, the cells **1102-1106** include three sectors; however, the claimed subject matter is not limited to utilization of cells with three sectors. The deployment **1100** can be employed when leakages from intra-cell sectors are significant. In particular, the deployment **1100** can use a substantially similar loading factor (or set of loading factors that each correspond to a particular carrier in a multi-carrier scenario) for sectors inside the same cell and different loading factors (or sets of loading factors) across different cells. Thus, according to the depicted example, cells **1102** can include three sectors that utilize loading factor **1** (LF**1**) (or set of loading factors LF**1**), cells **1104** can include three sectors that employ loading factor **2** (LF**2**) (or set of loading factors LF**2**), and cells **1106** can include three sectors that use loading factor **3** (LF**3**) (or set of loading factors LF**3**). Further, each cell **1102** can be adjacent to cell(s) **1104** and/or cell(s) **1106** (and cells **1104** and cells **1106** can similarly be adjacent to differing types of cells), and therefore, adjacent cells can utilize differing loading factors (e.g., a cell **1102** is not directly adjacent to another cell **1102**). It is contemplated, however, that any number of differing loading factors (or sets of loading factors) can be employed by different cells, and thus, the claimed subject matter is not limited to the illustrated example.

Referring to FIGS. **12-18**, methodologies relating to opportunistic uplink scheduling in a wireless communication network are illustrated. While, for purposes of simplicity of explanation, the methodologies are shown and described as a series of acts, it is to be understood and appreciated that the methodologies are not limited by the order of acts, as some acts may, in accordance with one or more embodiments, occur in different orders and/or concurrently with other acts from that shown and described herein. For example, those skilled in the art will understand and appreciate that a methodology could alternatively be represented as a series of interrelated states or events, such as in a state diagram. Moreover, not all illustrated acts may be required to implement a methodology in accordance with one or more embodiments.

Turning to FIG. **12**, illustrated is a methodology **1200** that facilitates scheduling uplink transmission based upon a consideration of time. At **1202**, a weighted interference budget can be determined as a function of time. The interference budget can be time varying and/or can be multiplied by a weighting factor that can be time varying. Further, the weighted interference budget can vary according to a predefined pattern and/or can follow an adaptively determined pattern (e.g., to enable load balancing). According to another illustration, time varying, weighted interference budgets utilized by nearby base stations (and/or cells) can complement each other; for instance, the sum of the time varying, weighted interference budgets can be constant over time.

At **1204**, a mobile device can be scheduled for uplink transmission at a particular time based upon the weighted interference budget. For example, a mobile device with a large path loss ratio (e.g., cell-boundary mobile device) can be scheduled when the weighted interference budget is relatively large and a mobile device with a small path loss ratio (e.g., close-to-base station mobile device) can be scheduled when the weighted interference budget is relatively small. At **1206**, an assignment can be transmitted to the mobile device related to the scheduled uplink transmission. For instance, the assignment can include information pertaining to time slot, duration, frequency (e.g., tone(s)), power level, rate, and so forth to be utilized by the mobile device for uplink transmission.

Now referring to FIG. **13**, illustrated is a methodology **1300** that facilitates altering a time variation of a weighted interference budget to enable load balancing. At **1302**, load balancing information pertaining to a base station and at least one neighboring base station in a network can be analyzed. For instance, a number of users served by each base station can be compared. According to another illustration, the types of users and/or path loss ratios associated with the users of each of the base stations can be evaluated. At **1304**, a weighting pattern that varies as a function of time can be adaptively adjusted based upon the load balancing analysis. By way of example, a mean value of the time varying weighting pattern can be increased for the base station when such base station serves a greater number of users than the neighboring base station(s). Further, it is contemplated that the weighting pattern can be adaptively adjusted in real time, periodically, etc. At **1306**, a weighted interference budget can be generated based upon the adaptively adjusted weighting pattern, where the weighted interference budget can be a function of time. The weighted interference budget can be utilized to schedule uplink transmissions.

Referring to FIG. **14**, illustrated is a methodology **1400** that facilitates scheduling uplink transmissions in a communication network including a first base station that includes a first sector utilizing a static interference budget with multi-carriers. At **1402**, channel quality reports can be received from one or more mobile devices. The channel quality reports can include a measurement of an interference ratio between a signal strength from the serving base station to the mobile device and a weighted sum of signal strengths from interfering base stations. At **1404**, a first mobile device can be scheduled for uplink transmission from the first sector on a first channel during a first time slot based on a first interference budget level. For example, the first channel can include a first frequency bandwidth. Further, it is to be appreciated that one or more mobile devices can be scheduled in addition to the first mobile device (and similarly the other mobile devices described below can be scheduled with one or more additional mobile devices). At **1406**, a second mobile device can be scheduled for uplink transmission from the first sector on a second channel during the first time slot based on a second interference budget level. The second channel, for instance, can include a second frequency bandwidth. Further, the first frequency bandwidth and the second frequency bandwidth can be non-overlapping. Moreover, the first interference budget level and the second interference budget level can differ from each other by at least 0.5 dB, for example. At **1408**, assignments can be transmitted to the first mobile device and the second mobile device related to the scheduled uplink transmissions. By way of illustration, the assignments can include information pertaining to a maximum interference budget assigned to the corresponding mobile device for the uplink transmission. Accordingly, the sum interference emitted from scheduled mobile device(s) upon each channel in the first sector of the first base station at the first time slot can be limited to the respective interference budget levels.

Pursuant to an example, the first base station can include a second sector. Thus, a third mobile device can be scheduled for uplink transmission from the second sector on a third channel during the first time slot based on a third interference budget level, where the third channel can include a third frequency bandwidth. Moreover, a fourth mobile device can be scheduled for uplink transmission from the second sector on a fourth channel during the first time slot based on a fourth interference budget level, where the fourth channel can include a fourth frequency bandwidth. Further, the third and fourth interference budget levels can be at least 0.5 dB different from each other. Additionally, the first frequency bandwidth and the third frequency bandwidth can have at least 50% in common while the second frequency bandwidth and the fourth frequency bandwidth can have at least 50% in common. According to another illustration, the first interference budget level can be greater than the third interference budget level and the second interference budget level can be less than the fourth interference budget level.

According to another example, the communication network can further include a second base station that comprises a third sector. Thus, a fifth mobile device can be scheduled for uplink transmission from the third sector on a fifth channel during the first time slot based on a fifth interference budget level, where the fifth channel can include a fifth frequency bandwidth. Additionally, a sixth mobile device can be scheduled for uplink transmission from the third sector on a sixth channel during the first time slot based on a sixth interference budget, where the sixth channel can include a sixth frequency bandwidth. Thereafter, assignments can be transmitted to the fifth and sixth mobile devices related to the scheduled uplink transmissions. Moreover, the fifth and sixth interference budget levels can differ by at least 0.5 dB.

Turning to FIG. **15**, illustrated is a methodology **1500** that facilitates scheduling uplink transmissions in a communication network including a first base station that includes a first sector employing a dynamic interference budget. At **1502**, channel quality reports can be received from one or more mobile devices. At **1504**, a first mobile device can be scheduled for uplink transmission from a first sector on a first channel during a first time slot based on a first interference budget level. At **1506**, a second mobile device can be scheduled for uplink transmission from the first sector on the first channel during a second time slot based on a second interference budget level. Further, the first interference budget level and the second interference budget levels can be determined from a first interference budget pattern that varies over time. The interference budget pattern can be pre-determined, dynamically adjusted, etc. At **1508**, assignments can be transmitted to the first mobile device and the second mobile device related to the scheduled uplink transmissions.

According to an example, a third mobile device can be scheduled for uplink transmission from the first sector on a second channel during the first time slot based on a third interference budget level and a fourth mobile device can be scheduled for uplink transmission from the first sector on the second channel during the second time slot based on a fourth interference budget level. Moreover, the third and fourth interference budget levels can be determined from a second interference budget pattern. Additionally, a summation of the first interference budget level and the third interference budget level can be within 0.5 dB from a summation of the second interference budget level and the fourth interference budget level.

Following a further illustration, the first base station can include a second sector. Moreover, a fifth mobile device can be scheduled for uplink transmission from the second sector on the first channel during the first time slot based on a fifth interference budget level. Additionally, a sixth mobile device can be scheduled for uplink transmission from the second sector on the first channel during the second time slot based on a sixth interference budget level, where the fifth and sixth interference budget levels can be determined from a third interference budget pattern. For example, the first and third interference budget patterns can be periodical with dissimilar periods. According to another illustration, the first and third interference budget patterns can be periodical with substantially similar periods and differing phases.

The communication network can further include a second base station that can comprise a third sector, for example. A seventh mobile device can be scheduled for uplink transmission from the third sector on the first channel during the first time slot based on a seventh interference budget level and an eighth mobile device can be scheduled for uplink transmission from the third sector on the first channel during the second time slot based on an eighth interference budget level. Further, the seventh and eighth interference budget levels can be determined from a fourth interference budget pattern.

With reference to FIG. **16**, illustrated is a methodology **1600** that facilitates scheduling uplink transmissions in a communication network including a first base station that includes a first sector employing static loading offset levels. At **1602**, a first loading factor utilized to evaluate a path loss ratio related to a first channel can be broadcasted. The first loading factor can be based on at least a first loading offset level. Further, the first loading factor can be a function of a number of mobile devices served on the first channel and the first loading offset level. At **1604**, a second loading factor utilized to evaluate a path loss ratio related to a second channel can be broadcasted. The second loading factor can be based on at least a second loading offset level. Moreover, the second loading factor can be a function of a number of mobile devices served on the second channel and the second loading offset level. Moreover, the first loading offset level and the second loading offset level can be at least 0.5 dB different from each other. At **1606**, channel quality reports can be received from one or more mobile devices pertaining to the evaluated path loss ratios. The channel quality reports can include measurements of interference ratios related to the first channel and/or second channel. For instance, the measurement of the interference ratio for the first channel can be between a signal strength from the serving base station to the mobile device and the weighted sum of signal strengths from interfering sectors, where the weighting can be a function of the first loading factor (and the interference ratio for the second channel can be similarly determined). At **1608**, a first mobile device can be scheduled for uplink transmission on the first channel based on the channel quality reports. The first channel can include a first frequency bandwidth, for example. At **1608**, a second mobile device can be scheduled for uplink transmission on the second channel based on the channel quality reports. The second channel can include a second frequency bandwidth, for instance. Further, the first frequency bandwidth and the second frequency bandwidth can be non-overlapping. At **1612**, assignments can be transmitted to the first mobile device and the second mobile device related to the scheduled uplink transmissions. The assignments can include a maximum interference budget allocated to the respective mobile devices for utilization with the scheduled uplink transmissions. The loading factors described herein can be functions of loading statuses (e.g., number of users) associated with corresponding sectors. Moreover, the loading offset levels can be offsets from nominal values, which can be the loading factors.

According to another example, the first base station can further include a second sector. Moreover, a third loading factor based on a third loading offset level utilized to evaluate a path loss ratio corresponding to the second sector and related to the first channel can be broadcasted, a fourth loading factor based on a fourth loading offset level utilized to evaluate a path loss ratio corresponding to the second sector and related to the second channel can be broadcasted, and channel quality reports from one or more mobile devices can be received. Further, a third mobile device can be scheduled for uplink transmission on the first channel based on the channel quality reports, a fourth mobile device can be scheduled for uplink transmission on the second channel based on the channel quality reports, and assignments can be transmitted to the third mobile device and the fourth mobile device related to the scheduled uplink transmissions. The third and fourth loading offset levels, for example, can be at least 0.5 dB different from one another. Additionally, the first loading offset level can be greater than the third loading offset level and the second loading offset level can be less than the fourth loading offset level.

Pursuant to a further illustration, the communication network can include a second base station that includes a third sector. A fifth loading factor based on a fifth loading offset level utilized to evaluate a path loss ratio corresponding to the third sector and related to the first channel can be broadcasted, a sixth loading factor based on a sixth loading offset level utilized to evaluate a path loss ratio corresponding to the third sector and related to the second channel can be broadcasted, and channel quality reports from one or more mobile devices can be received. Further, a fifth mobile device can be scheduled for uplink transmission on the first channel based on the channel quality reports, a sixth mobile device can be scheduled for uplink transmission on the second channel based on the channel quality reports, and assignments can be transmitted to the fifth mobile device and the sixth mobile device related to the scheduled uplink transmissions. Moreover, the first loading offset level can be greater than the fifth loading offset level and the second loading offset level can be less than the sixth loading offset level.

Turning to FIG. **17**, illustrated is a methodology **1700** that facilitates scheduling uplink transmissions in a communication network including a first base station that includes a first sector utilizing dynamic loading offset level pattern(s). At **1702**, a first loading factor determined from a first time varying loading offset level pattern corresponding to a first time slot can be broadcasted. The first loading factor can be based on a first loading offset level. At **1704**, a second loading factor determined from the first time varying loading offset level pattern corresponding to a second time slot can be broadcasted. The second loading factor can be based on a second loading offset level. The first loading offset level and the second loading offset level can differ by at least 0.5 dB. At **1706**, channel quality reports can be received from one or more mobile devices pertaining to evaluated path loss ratios during the first time slot and the second time slot. At **1708**, a first mobile device can be scheduled for uplink transmission during the first time slot based on the channel quality reports and the first loading factor. At **1710**, a second mobile device can be scheduled for uplink transmission during the second time slot based on the channel quality reports and the second loading factor. The first mobile device and the second mobile device can be scheduled for uplink transmission upon a first channel, which can include a first frequency bandwidth. At **1712**, assignments can be transmitted to the first mobile device and the second mobile device related to the scheduled uplink transmissions.

By way of illustration, a third loading factor based on a third loading offset level determined from a second time varying loading offset level pattern corresponding to the first time slot can be broadcasted and a fourth loading factor based on a fourth loading offset level determined from the second time varying loading offset level pattern corresponding to the second time slot can be broadcasted. The third loading offset level and the fourth loading offset level can differ from each other by at least 0.5 dB. Moreover, a third mobile device can be scheduled for uplink transmission during the first time slot on a second channel based at least in part upon the channel quality reports and the third loading factor. The second channel can include a second frequency bandwidth. Further, a fourth mobile device can be scheduled for uplink transmission during the second time slot on the second channel based at least in part upon the channel quality reports and the fourth loading factor. For instance, a summation of the first loading offset level and the third loading offset level can be within 0.5 dB of a summation of the second loading offset level and the fourth loading offset level. Additionally, the first frequency bandwidth and the second frequency bandwidth can be non-overlapping. According to further examples, the first base station can include a disparate sector that utilizes a differing loading offset level pattern and/or a differing base station in the communication network can include a disparate sector that employs a differing loading offset level pattern.

With reference to FIG. **18**, illustrated is a methodology that facilitates operating a wireless mobile device in an environment that utilizes a dynamic loading offset level pattern. At **1802**, a first loading factor can be received based on at least a first loading offset information from a first base station at a first time slot. At **1804**, a first loading offset level pattern can be determined from the first loading offset information. For example, the first loading offset level pattern can be deciphered by employing a lookup table, a predetermined function, and the like. At **1806**, a first interference ratio can be determined at a second time slot based on at least a first loading offset level determined by the first loading offset level pattern. At **1808**, a first signal that includes the first interference ratio can be sent at the second time slot to the first base station.

According to a further example, a second interference ratio can be determined at a third time slot based on at least a second loading offset level determined by the first loading offset level pattern. Further, a second signal that includes the second interference ratio can be sent at the third time slot to the base station. Moreover, the first loading offset level and the second loading offset level can differ by at least 0.5 dB.

Pursuant to a further illustration, a second loading factor that includes at least a second loading offset information can be received from a second base station at a fourth time slot. A second loading offset level pattern can be determined from the second loading offset information. The second loading offset level pattern can be generated by using a lookup table, a predetermined function, etc. Moreover, the first interference ratio can be determined based on at least the first loading offset level determined by the first loading offset level pattern and the second loading offset level determined by the second loading offset level pattern.

It will be appreciated that, in accordance with one or more aspects described herein, inferences can be made regarding uplink scheduling in a wireless communication network. As used herein, the term to "infer" or "inference" refers generally to the process of reasoning about or inferring states of the system, environment, and/or user from a set of observations as captured via events and/or data. Inference can be employed to identify a specific context or action, or can generate a probability distribution over states, for example. The inference can be probabilistic—that is, the computation of a probability distribution over states of interest based on a consideration of data and events. Inference can also refer to techniques employed for composing higher-level events from a set of events and/or data. Such inference results in the construction of new events or actions from a set of observed events and/or stored event data, whether or not the events are correlated in close temporal proximity, and whether the events and data come from one or several event and data sources.

According to an example, one or more methods presented above can include making inferences pertaining to identifying respective loads encountered by base station(s) and/or cell(s). In accordance with another example, loading information can be leveraged to infer how to adapt weighting pattern(s). It will be appreciated that the foregoing examples are illustrative in nature and are not intended to limit the number of inferences that can be made or the manner in which such inferences are made in conjunction with the various embodiments and/or methods described herein.

FIG. **19** depicts an example communication system **1900** implemented in accordance with various aspects including multiple cells: cell **1** **1902**, cell M **1904**. Note that neighboring cells **1902**, **1904** overlap slightly, as indicated by cell boundary region **1968**. Each cell **1902**, **1904** of system **1900** includes three sectors. Cells which have not been subdivided into multiple sectors (N=1), cells with two sectors (N=2) and cells with more than 3 sectors (N>3) are also possible in accordance with various aspects. Cell **1902** includes a first sector, sector **1** **1910**, a second sector, sector II **1912**, and a third sector, sector III **1914**. Each sector **1910**, **1912**, **1914** has two sector boundary regions; each boundary region is shared between two adjacent sectors.

Cell **1** **1902** includes a base station (BS), base station I **1906**, and a plurality of end nodes (ENs) (e.g., wireless terminals) in each sector **1910**, **1912**, **1914**. Sector I **1910** includes EN(**1**) **1936** and EN(X) **1938**; sector II **1912** includes EN(**1'**) **1944** and EN(X') **1946**; sector III **1914** includes EN(**1"**) **1952** and EN(X") **1954**. Similarly, cell M **1904** includes base station M **1908**, and a plurality of end nodes (ENs) in each sector **1922**, **1924**, **1926**. Sector I **1922** includes EN(**1**) **1936'** and EN(X) **1938'**; sector II **1924** includes EN(**1'**) **1944'** and EN(X') **1946'**; sector **3** **1926** includes EN(**1"**) **1952'** and EN(X") **1954'**.

System **1900** also includes a network node **1960** which is coupled to BS I **1906** and BS M **1908** via network links **1962**, **1964**, respectively. Network node **1960** is also coupled to other network nodes, e.g., other base stations, AAA server nodes, intermediate nodes, routers, etc. and the Internet via network link **1966**. Network links **1962**, **1964**, **1966** may be, e.g., fiber optic cables. Each end node, e.g., EN(**1**) **1936** may be a wireless terminal including a transmitter as well as a receiver. The wireless terminals, e.g., EN(**1**) **1936** may move through system **1900** and may communicate via wireless links with the base station in the cell in which the EN is currently located. The wireless terminals, (WTs), e.g., EN(**1**) **1936**, may communicate with peer nodes, e.g., other WTs in system **1900** or outside system **1900** via a base station, e.g., BS **1906**, and/or network node **1960**. WTs, e.g., EN(**1**) **1936** may be mobile communications devices such as cell phones, personal data assistants with wireless modems, etc.

FIG. **20** illustrates an example base station **2000** in accordance with various aspects. Base station **2000** implements tone subset allocation sequences, with different tone subset allocation sequences generated for respective different sector types of the cell. Base station **2000** may be used as any one of base stations **1906**, **1908** of the system **1900** of FIG. **19**. The base station **2000** includes a receiver **2002**, a transmitter **2004**, a processor **2006**, e.g., CPU, an input/output interface **2008** and memory **2010** coupled together by a bus **2009** over which various elements **2002**, **2004**, **2006**, **2008**, and **2010** may interchange data and information.

Sectorized antenna **2003** coupled to receiver **2002** is used for receiving data and other signals, e.g., channel reports, from wireless terminals transmissions from each sector within the base station's cell. Sectorized antenna **2005** coupled to transmitter **2004** is used for transmitting data and other signals, e.g., control signals, pilot signal, beacon signals, etc. to wireless terminals **2100** (see FIG. **21**) within each sector of the base station's cell. In various aspects, base station **2000** may employ multiple receivers **2002** and multiple transmitters **2004**, e.g., an individual receiver **2002** for each sector and an individual transmitter **2004** for each sector. Processor **2006**, may be, e.g., a general purpose central processing unit (CPU). Processor **2006** controls operation of base station **2000** under direction of one or more routines **2018** stored in memory **2010** and implements the methods. I/O interface **2008** provides a connection to other network nodes, coupling the BS **2000** to other base stations, access routers, AAA server nodes, etc., other networks, and the Internet. Memory **2010** includes routines **2018** and data/information **2020**.

Data/information **2020** includes data **2036**, tone subset allocation sequence information **2038** including downlink strip-symbol time information **2040** and downlink tone information **2042**, and wireless terminal (WT) data/info **2044** including a plurality of sets of WT information: WT **1** info **2046** and WT N info **2060**. Each set of WT info, e.g., WT **1** info **2046** includes data **2048**, terminal ID **2050**, sector ID **2052**, uplink channel information **2054**, downlink channel information **2056**, and mode information **2058**.

Routines **2018** include communications routines **2022** and base station control routines **2024**. Base station control routines **2024** includes a scheduler module **2026** and signaling routines **2028** including a tone subset allocation routine **2030** for strip-symbol periods, other downlink tone allocation hopping routine **2032** for the rest of symbol periods, e.g., non strip-symbol periods, and a beacon routine **2034**.

Data **2036** includes data to be transmitted that will be sent to encoder **2014** of transmitter **2004** for encoding prior to transmission to WTs, and received data from WTs that has been processed through decoder **2012** of receiver **2002** following reception. Downlink strip-symbol time information **2040** includes the frame synchronization structure information, such as the superslot, beaconslot, and ultraslot structure information and information specifying whether a given symbol period is a strip-symbol period, and if so, the index of the strip-symbol period and whether the strip-symbol is a resetting point to truncate the tone subset allocation sequence used by the base station. Downlink tone information **2042** includes information including a carrier frequency assigned to the base station **2000**, the number and frequency of tones, and the set of tone subsets to be allocated to the strip-symbol periods, and other cell and sector specific values such as slope, slope index and sector type.

Data **2048** may include data that WT**1 2100** has received from a peer node, data that WT **1 2100** desires to be transmitted to a peer node, and downlink channel quality report feedback information. Terminal ID **2050** is a base station **2000** assigned ID that identifies WT **1 2100**. Sector ID **2052** includes information identifying the sector in which WT**1 2100** is operating. Sector ID **2052** can be used, for example, to determine the sector type. Uplink channel information **2054** includes information identifying channel segments that have been allocated by scheduler **2026** for WT**1 2100** to use, e.g., uplink traffic channel segments for data, dedicated uplink control channels for requests, power control, timing control, etc. Each uplink channel assigned to WT**1 2100** includes one or more logical tones, each logical tone following an uplink hopping sequence. Downlink channel information **2056** includes information identifying channel segments that have been allocated by scheduler **2026** to carry data and/or information to WT**1 2100**, e.g., downlink traffic channel segments for user data. Each downlink channel assigned to WT**1 2100** includes one or more logical tones, each following a downlink hopping sequence. Mode information **2058** includes information identifying the state of operation of WT**1 2100**, e.g. sleep, hold, on.

Communications routines **2022** control the base station **2000** to perform various communications operations and implement various communications protocols. Base station control routines **2024** are used to control the base station **2000** to perform basic base station functional tasks, e.g., signal generation and reception, scheduling, and to implement the steps of the method of some aspects including transmitting signals to wireless terminals using the tone subset allocation sequences during the strip-symbol periods.

Signaling routine **2028** controls the operation of receiver **2002** with its decoder **2012** and transmitter **2004** with its encoder **2014**. The signaling routine **2028** is responsible for controlling the generation of transmitted data **2036** and control information. Tone subset allocation routine **2030** constructs the tone subset to be used in a strip-symbol period using the method of the aspect and using data/information **2020** including downlink strip-symbol time info **2040** and sector ID **2052**. The downlink tone subset allocation sequences will be different for each sector type in a cell and different for adjacent cells. The WTs **2100** receive the signals in the strip-symbol periods in accordance with the downlink tone subset allocation sequences; the base station **2000** uses the same downlink tone subset allocation sequences in order to generate the transmitted signals. Other downlink tone allocation hopping routine **2032** constructs downlink tone hopping sequences, using information including downlink tone information **2042**, and downlink channel information **2056**, for the symbol periods other than the strip-symbol periods. The downlink data tone hopping sequences are synchronized across the sectors of a cell. Beacon routine **2034** controls the transmission of a beacon signal, e.g., a signal of relatively high power signal concentrated on one or a few tones, which may be used for synchronization purposes, e.g., to synchronize the frame timing structure of the downlink signal and therefore the tone subset allocation sequence with respect to an ultra-slot boundary.

FIG. **21** illustrates an example wireless terminal (e.g., end node, mobile device, . . .) **2100** which can be used as any one of the wireless terminals (e.g., end nodes, mobile devices, . . .), e.g., EN(**1**) **1936**, of the system **1900** shown in FIG. **19**. Wireless terminal **2100** implements the tone subset allocation sequences. Wireless terminal **2100** includes a receiver **2102** including a decoder **2112**, a transmitter **2104** including an encoder **2114**, a processor **2106**, and memory **2108** which are coupled together by a bus **2110** over which the various elements **2102**, **2104**, **2106**, **2108** can interchange data and information. An antenna **2103** used for receiving signals from a base station **2000** (and/or a disparate wireless terminal) is coupled to receiver **2102**. An antenna **2105** used for transmitting signals, e.g., to base station **2000** (and/or a disparate wireless terminal) is coupled to transmitter **2104**.

The processor **2106** (e.g., a CPU) controls operation of wireless terminal **2100** and implements methods by executing routines **2120** and using data/information **2122** in memory **2108**.

Data/information **2122** includes user data **2134**, user information **2136**, and tone subset allocation sequence information **2150**. User data **2134** may include data, intended for a peer node, which will be routed to encoder **2114** for encoding prior to transmission by transmitter **2104** to base station **2000**, and data received from the base station **2000** which has been processed by the decoder **2112** in receiver **2102**. User information **2136** includes uplink channel information **2138**, downlink channel information **2140**, terminal ID information **2142**, base station ID information **2144**, sector ID information **2146**, and mode information **2148**. Uplink channel information **2138** includes information identifying uplink channels segments that have been assigned by base station **2000** for wireless terminal **2100** to use when transmitting to the base station **2000**. Uplink channels may include uplink traffic channels, dedicated uplink control channels, e.g., request channels, power control channels and timing control channels. Each uplink channel includes one or more logic tones, each logical tone following an uplink tone hopping sequence. The uplink hopping sequences are different between each sector type of a cell and between adjacent cells. Downlink channel information **2140** includes information identifying downlink channel segments that have been assigned by base station **2000** to WT **2100** for use when BS **2000** is transmitting data/information to WT **2100**. Downlink channels may include downlink traffic channels and assignment channels, each downlink channel including one or more logical tone, each logical tone following a downlink hopping sequence, which is synchronized between each sector of the cell.

User info **2136** also includes terminal ID information **2142**, which is a base station **2000** assigned identification, base station ID information **2144** which identifies the specific base station **2000** that WT has established communications with, and sector ID info **2146** which identifies the specific sector of the cell where WT **2000** is presently located. Base station ID **2144** provides a cell slope value and sector ID info **2146** provides a sector index type; the cell slope value and sector index type may be used to derive tone hopping sequences. Mode information **2148** also included in user info **2136** identifies whether the WT **2100** is in sleep mode, hold mode, or on mode.

Tone subset allocation sequence information **2150** includes downlink strip-symbol time information **2152** and downlink tone information **2154**. Downlink strip-symbol time information **2152** include the frame synchronization structure information, such as the superslot, beaconslot, and ultraslot structure information and information specifying whether a given symbol period is a strip-symbol period, and if so, the index of the strip-symbol period and whether the strip-symbol is a resetting point to truncate the tone subset allocation sequence used by the base station. Downlink tone info **2154** includes information including a carrier frequency assigned to the base station **2000**, the number and frequency of tones, and the set of tone subsets to be allocated to the strip-symbol periods, and other cell and sector specific values such as slope, slope index and sector type.

Routines **2120** include communications routines **2124** and wireless terminal control routines **2126**. Communications routines **2124** control the various communications protocols used by WT **2100**. For example, communications routines **2124** may enable communicating via a wide area network (e.g., with base station **2000**) and/or a local area peer-to-peer network (e.g., directly with disparate wireless terminal(s)). By way of further example, communications routines **2124** may enable receiving a broadcast signal (e.g., from base station **2000**). Wireless terminal control routines **2126** control basic wireless terminal **2100** functionality including the control of the receiver **2102** and transmitter **2104**.

With reference to FIG. **22**, illustrated is a system **2200** that enables scheduling uplink transmissions by utilizing a static interference budget in a multi-carrier environment. For example, system **2200** can reside at least partially within a base station. It is to be appreciated that system **2200** is represented as including functional blocks, which can be functional blocks that represent functions implemented by a processor, software, or combination thereof (e.g., firmware). System **2200** includes a logical grouping **2202** of electrical components that can act in conjunction. For instance, logical grouping **2202** can include an electrical component for scheduling a first mobile device for uplink transmission from a first sector on a first channel during a first time slot based on a first interference budget level **2204**. Further, logical grouping **2202** can comprise an electrical component for scheduling a second mobile device for uplink transmission from the first sector on a second channel during the first time slot based on a second interference budget level **2206**. Moreover, logical grouping **2202** can include an electrical component for sending assignments related to the uplink transmissions to the scheduled mobile devices **2208**. Additionally, system **2200** can include a memory **2210** that retains instructions for executing functions associated with electrical components **2204**, **2206**, and **2208**. While shown as being external to memory **2210**, it is to be understood that one or more of electrical components **2204**, **2206**, and **2208** can exist within memory **2210**.

Turning to FIG. **23**, illustrated is a system **2300** that enables scheduling uplink transmissions by utilizing a dynamic interference budget. System **2300** can reside at least partially within a base station. It is to be appreciated that system **2300** is represented as including functional blocks, which can be functional blocks that represent functions implemented by a processor, software, or combination thereof (e.g., firmware). System **2300** includes a logical grouping **2302** of electrical components that can act in conjunction. For instance, logical grouping **2302** can include an electrical component for scheduling a first mobile device for uplink transmission from a first sector on a first channel during a first time slot based on a first interference budget level **2304**. Moreover, logical grouping **2302** can include an electrical component for scheduling a second mobile device for uplink transmission from the first sector on the first channel during a second time slot based on a second interference budget level **2306**. Further, logical grouping **2302** can comprise an electrical component for sending assignments related to the uplink transmissions to the scheduled mobile devices **2308**. Additionally, system **2300** can include a memory **2310** that retains instructions for executing functions associated with electrical components **2304**, **2306**, and **2308**. While shown as being external to memory **2310**, it is to be understood that one or more of electrical components **2304**, **2306**, and **2308** can exist within memory **2310**.

With reference to FIG. **24**, illustrated is a system **2400** that enables scheduling uplink transmissions by utilizing a static loading offset level. For example, system **2400** can reside at least partially within a base station. It is to be appreciated that system **2400** is represented as including functional blocks, which can be functional blocks that represent functions implemented by a processor, software, or combination thereof (e.g., firmware). System **2400** includes a logical grouping **2402** of electrical components that can act in conjunction. For instance, logical grouping **2402** can include an electrical component for broadcasting a first loading factor employed to analyze a path loss ratio related to a first channel **2404**. For instance, the first loading factor can be based on at least a first loading offset level. Further, logical grouping **2402** can comprise an electrical component for broadcasting a second loading factor employed to analyze a path loss ratio related to a second channel **2406**. The second loading factor, for example, can be based on at least a second loading offset level. Moreover, logical grouping **2402** can include an electrical component for obtaining channel quality reports from at least one mobile device related to the analyzed path loss ratios **2408**. Logical grouping **2402** can further include an electrical component for scheduling a first mobile device for uplink transmission on the first channel based on the channel quality reports **2410**. Logical grouping **2402** can also include an electrical component for scheduling a second mobile device for uplink transmission on the second channel based on the channel quality reports **2412**. Moreover, logical grouping **2402** can comprise an electrical component for sending assignments to the scheduled mobile devices **2414**. Additionally, system **2400** can include a memory **2416** that retains instructions for executing functions associated with electrical components **2404**, **2406**, **2408**, **2410**, **2412**, and **2414**. While shown as being external to memory **2416**, it is to be understood that one or more of electrical components **2404**, **2406**, **2408**, **2410**, **2412**, and **2414** can exist within memory **2416**.

With reference to FIG. **25**, illustrated is a system **2500** that enables scheduling uplink transmissions by utilizing a dynamic loading offset level pattern. For example, system **2500** can reside at least partially within a base station. It is to be appreciated that system **2500** is represented as including functional blocks, which can be functional blocks that represent functions implemented by a processor, software, or combination thereof (e.g., firmware). System **2500** includes a logical grouping **2502** of electrical components that can act in conjunction. For instance, logical grouping **2502** can include an electrical component for broadcasting a first loading factor determined from a first time varying loading offset level pattern based on a first time slot **2504**. For instance, the first loading factor can be based on a first loading offset level. Further, logical grouping **2502** can comprise an electrical component for broadcasting a second loading factor determined from the first time varying loading offset level pattern based on a second time slot **2506**. The second loading factor, for example, can be based on a second loading offset level. Moreover, logical grouping **2502** can include an electrical component for obtaining channel quality reports from at least one mobile device related to the analyzed path loss ratios **2508**. Logical grouping **2502** can further include an electrical component for scheduling a first mobile device for uplink transmission during the first time slot based on the channel quality reports and the first loading factor **2510**. Logical grouping **2502** can also include an electrical component for scheduling a second mobile device for uplink transmission during the second time slot based on the channel quality reports and the second loading factor **2512**. Moreover, logical grouping **2502** can comprise an electrical component for sending assignments to the scheduled mobile devices **2514**. Additionally, system **2500** can include a memory **2516** that retains instructions for executing functions associated with electrical components **2504**, **2506**, **2508**, **2510**, **2512**, and **2514**. While shown as being external to memory **2516**, it is to be understood that one or more of electrical components **2504**, **2506**, **2508**, **2510**, **2512**, and **2514** can exist within memory **2516**.

Turning to FIG. **26**, illustrated is a system **2600** that enables evaluating an interference ratio based upon a dynamic loading offset level pattern. System **2600** can reside at least partially within a mobile device. It is to be appreciated that system **2600** is represented as including functional blocks, which can be functional blocks that represent functions implemented by a processor, software, or combination thereof (e.g., firmware). System **2600** includes a logical grouping **2602** of electrical components that can act in conjunction. For instance, logical grouping **2602** can include an electrical component for obtaining a first loading factor based on at least a first loading offset information from a first base station at a first time slot **2604**. Moreover, logical grouping **2602** can include an electrical component for determining a first loading offset level pattern from the first loading offset information **2606**. Further, logical grouping **2602** can comprise an electrical component for evaluating a first interference ratio at a second time slot based on a first loading offset level determined from the first loading offset level pattern **2608**. Logical grouping **2602** can also include an electrical component for transmitting a signal that includes the first interference ratio at the second time slot to the first base station **2610**. Additionally, system **2600** can include a memory **2612** that retains instructions for executing functions associated with electrical components **2604**, **2606**, **2608**, and **2610**. While shown as being external to memory **2612**, it is to be understood that one or more of electrical components **2604**, **2606**, **2608**, and **2610** can exist within memory **2612**.

When the embodiments are implemented in software, firmware, middleware or microcode, program code or code segments, they may be stored in a machine-readable medium, such as a storage component. A code segment may represent a procedure, a function, a subprogram, a program, a routine, a subroutine, a module, a software package, a class, or any combination of instructions, data structures, or program statements. A code segment may be coupled to another code segment or a hardware circuit by passing and/or receiving information, data, arguments, parameters, or memory contents. Information, arguments, parameters, data, etc. may be passed, forwarded, or transmitted using any suitable means including memory sharing, message passing, token passing, network transmission, etc.

For a software implementation, the techniques described herein may be implemented with modules (e.g., procedures, functions, and so on) that perform the functions described herein. The software codes may be stored in memory units and executed by processors. The memory unit may be implemented within the processor or external to the processor, in which case it can be communicatively coupled to the processor via various means as is known in the art.

What has been described above includes examples of one or more embodiments. It is, of course, not possible to describe every conceivable combination of components or methodologies for purposes of describing the aforementioned embodiments, but one of ordinary skill in the art may recognize that many further combinations and permutations of various embodiments are possible. Accordingly, the described embodiments are intended to embrace all such alterations, modifications and variations that fall within the spirit and scope of the appended claims. Furthermore, to the extent that the term "includes" is used in either the detailed description or the claims, such term is intended to be inclusive in a manner similar to the term "comprising" as "comprising" is interpreted when employed as a transitional word in a claim.

What is claimed is:

1. A method that facilitates scheduling uplink transmissions in a communication network including a first base station that includes a first sector utilizing a dynamic loading offset level pattern, the method comprising:

broadcasting a first loading factor based on a first loading offset level determined from a first time varying loading offset level pattern corresponding to a first time slot;

broadcasting a second loading factor based on a second loading offset level determined from the first time varying loading offset level pattern corresponding to a second time slot, the first loading offset level differing from the second loading offset level by at least 0.5 dB;

receiving channel quality reports from one or more mobile devices pertaining to evaluated path loss ratios during the first time slot and the second time slot;

scheduling a first mobile device for uplink transmission during the first time slot on a first channel based on the channel quality reports and the first loading factor;

scheduling a second mobile device for uplink transmission during the second time slot on the first channel based on the channel quality reports and the second loading factor; and

transmitting assignments to the first mobile device and the second mobile device related to the scheduled uplink transmissions.

2. The method of claim **1**, wherein the assignments include information related to a maximum interference budget assigned to the corresponding mobile device for the uplink transmission.

3. The method of claim **1**, further comprising:

broadcasting a third loading factor based on a third loading offset level determined from a second time varying loading offset level pattern corresponding to the first time slot;

broadcasting a fourth loading factor based on a fourth loading offset level determined from the second time varying loading offset level pattern corresponding to the second time slot, the third loading offset level differing from the fourth loading offset level by at least 0.5 dB;

scheduling a third mobile device for uplink transmission during the first time slot on a second channel based at least in part upon the channel quality reports and the third loading factor; and

scheduling a fourth mobile device for uplink transmission during the second time slot on the second channel based at least in part upon the channel quality reports and the fourth loading factor.

4. The method of claim **3**, wherein a summation of the first loading offset level and the third loading offset level is within 0.5 dB of a summation of the second loading offset level and the fourth loading offset level.

5. The method of claim **3**, wherein a first frequency bandwidth associated with the first channel is non-overlapping with a second frequency bandwidth associated with the second channel.

6. The method of claim 1, wherein the first base station further includes a second sector, the method further comprising:

broadcasting a fifth loading factor based on a fifth loading offset level determined from a third time varying loading offset level pattern corresponding to the first time slot utilized to evaluate a path loss ratio corresponding to the second sector;

broadcasting a sixth loading factor based on a sixth loading offset level determined from the third time varying loading offset level pattern corresponding to the second time slot utilized to evaluate a path loss ratio corresponding to the second sector, the fifth loading offset level differing from the sixth loading offset level by at least 0.5 dB;

scheduling a fifth mobile device for uplink transmission during the first time slot on the first channel based at least in part upon the channel quality reports and the fifth loading factor; and

scheduling a sixth mobile device for uplink transmission during the second time slot on the first channel based at least in part upon the channel quality reports and the sixth loading factor.

7. The method of claim 6, wherein the first time varying loading offset level pattern and the third time varying loading offset level pattern are periodical with dissimilar periods.

8. The method of claim 6, wherein the first time varying loading offset level pattern and the third time varying loading offset level pattern are periodical with substantially similar periods and differing phases.

9. The method of claim 1, wherein the communication network further includes a second base station that includes a third sector, the method further comprising:

broadcasting a seventh loading factor based on a seventh loading offset level determined from a fourth time varying loading offset level pattern corresponding to the first time slot utilized to evaluate a path loss ratio corresponding to the third sector;

broadcasting an eighth loading factor based on an eighth loading offset level determined from the fourth time varying loading offset level pattern corresponding to the second time slot utilized to evaluate a path loss ratio corresponding to the third sector, the seventh loading offset level differing from the eighth loading offset level by at least 0.5 dB;

scheduling a seventh mobile device for uplink transmission during the first time slot on the first channel based at least in part upon the channel quality reports and the seventh loading factor; and

scheduling an eighth mobile device for uplink transmission during the second time slot on the first channel based at least in part upon the channel quality reports and the eighth loading factor.

10. The method of claim 9, wherein the first time varying loading offset level pattern and the fourth time varying loading offset level pattern are periodical with dissimilar periods.

11. The method of claim 9, wherein the first time varying loading offset level pattern and the fourth time varying loading offset level pattern are periodical with substantially similar periods and differing phases.

12. A wireless communications apparatus, comprising:

a memory that retains instructions related to broadcasting a first loading factor based on a first loading offset level determined from a first time varying loading offset level pattern corresponding to a first time slot, broadcasting a second loading factor based on a second loading offset level determined from the first time varying loading offset level pattern corresponding to a second time slot, the first loading offset level differs from the second loading offset level by at least 0.5 dB, receiving channel quality reports from one or more mobile devices pertaining to evaluated path loss ratios during the first time slot and the second time slot, scheduling a first mobile device for uplink transmission during the first time slot on a first channel based on the channel quality reports and the first loading factor, scheduling a second mobile device for uplink transmission during the second time slot on the first channel based on the channel quality reports and the second loading factor, and sending assignments to the first mobile device and the second mobile device related to the scheduled uplink transmissions; and

a processor, coupled to the memory, configured to execute the instructions retained in the memory.

13. The wireless communications apparatus of claim 12, wherein said wireless communications apparatus is a serving first base station: and

wherein the channel quality reports include a measurement of an interference ratio between a signal strength from the serving first base station to a respective mobile device and a weighted sum of signal strengths from interfering base stations, wherein the weight is a function of a respective loading factor for a particular time slot.

14. The wireless communications apparatus of claim 12, wherein the memory further retains instructions related to broadcasting a third loading factor based on a third loading offset level determined from a second time varying loading offset level pattern corresponding to the first time slot, broadcasting a fourth loading factor based on a fourth loading offset level determined from the second time varying loading offset level pattern corresponding to the second time slot, the third loading offset level differing from the fourth loading offset level by at least 0.5 dB, scheduling a third mobile device for uplink transmission during the first time slot on a second channel based at least in part upon the channel quality reports and the third loading factor, and scheduling a fourth mobile device for uplink transmission during the second time slot on the second channel based at least in part upon the channel quality reports and the fourth loading factor.

15. The wireless communications apparatus of claim 12, wherein the memory further retains instructions related to broadcasting a fifth loading factor based on a fifth loading offset level determined from a third time varying loading offset level pattern corresponding to the first time slot utilized to evaluate a path loss ratio corresponding to a second sector, broadcasting a sixth loading factor based on a sixth loading offset level determined from the third time varying loading offset level pattern corresponding to the second time slot utilized to evaluate a path loss ratio corresponding to the second sector, the fifth loading offset level differs from the sixth loading offset level by at least 0.5 dB, scheduling a fifth mobile device for uplink transmission during the first time slot on the first channel based at least in part upon the channel quality reports and the fifth loading factor, and scheduling a sixth mobile device for uplink transmission during the second time slot on the first channel based at least in part upon the channel quality reports and the sixth loading factor.

16. The wireless communications apparatus of claim 15, wherein said wireless communications apparatus is a first wireless communication base station that includes a first sector and the second sector.

17. The wireless communications apparatus of claim 15, wherein said wireless communications apparatus is a first wireless communication base station that includes a first sec-

tor and wherein a second wireless communication base station includes the second sector.

18. The wireless communications apparatus of claim **15**, wherein the first time varying loading offset level pattern and the third time varying loading offset level pattern have at least one of differing periods and differing phases.

19. A wireless communications apparatus that enables scheduling uplink transmissions by utilizing a dynamic loading offset level pattern, comprising:

means for broadcasting a first loading factor based on a first loading offset level determined from a first time varying loading offset level pattern based on a first time slot;

means for broadcasting a second loading factor based on a second loading offset level determined from the first time varying loading offset level pattern based on a second time slot, wherein the first loading offset level differs from the second loading offset level by at least 0.5 dB;

means for obtaining channel quality reports from at least one mobile device related to analyzed path loss ratios;

means for scheduling a first mobile device for uplink transmission during the first time slot on a first channel based on the channel quality reports and the first loading factor;

means for scheduling a second mobile device for uplink transmission during the second time slot on the first channel based on the channel quality reports and the second loading factor; and

means for sending assignments to the first mobile device and the second mobile device.

20. The wireless communications apparatus of claim **19**, further comprising:

means for broadcasting a third loading factor based on a third loading offset level and a fourth loading factor based on a fourth loading offset level, the third loading factor being determined from a second time varying loading offset level pattern corresponding to the first time slot and the fourth loading factor being determined from the second time varying loading offset level pattern corresponding to the second time slot, the third loading offset level differing from the fourth loading offset level by at least 0.5 dB; and

means for scheduling a third mobile device and a fourth mobile device for uplink transmission, the third mobile device being scheduled during the first time slot on a second channel based at least in part upon the channel quality reports and the third loading factor and the fourth mobile device being scheduled during the second time slot on the second channel based at least in part upon the channel quality reports and the fourth loading factor.

21. The wireless communications apparatus of claim **19**, further comprising:

means for broadcasting a fifth loading factor based on a fifth loading offset level and a sixth loading factor based on a sixth loading offset level, the fifth loading factor being determined from a third time varying loading offset level pattern corresponding to the first time slot utilized to evaluate a path loss ratio corresponding to a second sector and the sixth loading factor being determined from the third time varying loading offset level pattern corresponding to the second time slot utilized to evaluate a path loss ratio corresponding to the second sector, the fifth loading offset level differing from the sixth loading offset level by at least 0.5 dB; and

means for scheduling a fifth mobile device and a sixth mobile device for uplink transmission, the fifth mobile device being scheduled during the first time slot on the first channel based at least in part upon the channel quality reports and the fifth loading factor and the sixth mobile device being scheduled during the second time slot on the first channel based at least in part upon the channel quality reports and the sixth loading factor.

22. A non-transitory machine-readable medium having stored thereon machine-executable instructions for controlling a first base station, the non-transitory machine-readable medium including machine-executable instructions which when executed by a processor control said first station to perform the steps of:

broadcasting a first loading factor based on a first loading offset level and a second loading factor based on a second loading offset level identified from a first time varying loading offset level pattern, the first loading factor corresponding to a first time slot and the second loading factor corresponding to a second time slot, wherein the first loading offset level differs from the second loading offset level by at least 0.5 dB;

receiving channel quality reports from at least one mobile device related path loss ratios generated based upon the first loading factor and the second loading factor; and

scheduling a first mobile device for uplink transmission during the first time slot and a second mobile device for uplink transmission during the second time slot based upon the channel quality reports.

23. The non-transitory machine-readable medium of claim **22**, further comprising machine-executable instructions which when executed by the processor control said first station to perform the steps of:

broadcasting a third loading factor based on a third loading offset level and a fourth loading factor based on a fourth loading offset level identified from a second time varying loading offset level pattern associated with a second sector, the second time varying loading offset level pattern and the first time varying loading offset level pattern having at least one of disparate periods and disparate phases, the third loading factor corresponding to the first time slot and the fourth loading factor corresponding to the second time slot; and

scheduling a third mobile device for uplink transmission during the first time slot and a fourth mobile device for uplink transmission during the second time slot based upon the channel quality reports.

24. In a wireless communications system, an apparatus comprising:

a processor configured to:

broadcast a first loading factor based on a first loading offset level and a second loading factor based on a second loading offset level identified from a first time varying loading offset level pattern, the first loading factor corresponding to a first time slot and the second loading factor corresponding to a second time slot, wherein the first loading offset level differs from the second loading offset level by at least 0.5 dB;

obtain channel quality reports from at least one mobile device related path loss ratios generated based upon the first loading factor and the second loading factor; and

schedule a first mobile device for uplink transmission during the first time slot and a second mobile device for uplink transmission during the second time slot based upon the channel quality reports.

25. A method of operating a wireless mobile device in an environment that utilizes a dynamic loading offset level pattern, the method comprising:

receiving a first loading factor based on at least a first loading offset information from a first base station at a first time slot;

determining a first loading offset level pattern from the first loading offset information;

determining a first interference ratio at a second time slot based on at least a first loading offset level determined by the first loading offset level pattern;

determining a second interference ratio at a third time slot based on at least a second loading offset level determined by the first loading offset level pattern, the first loading offset level and the second loading offset level differing by at least 0.5 dB;

sending a first signal that includes the first interference ratio at the second time slot to the first base station; and

sending a second signal that includes the second interference ratio at the third time slot to the first base station.

26. The method of claim **25**, further comprising determining the first loading offset level pattern by employing a lookup table.

27. The method of claim **25**, further comprising determining the first loading offset level pattern by utilizing a predetermined function.

28. The method of claim **25**, further comprising:

receiving a second loading factor that includes at least a second loading offset information from a second base station at a fourth time slot;

determining a second loading offset level pattern from the second loading offset information by employing at least one of a lookup table or a predetermined function; and

determining the first interference ratio based on at least the first loading offset level determined by the first loading offset level pattern and the second loading offset level determined by the second loading offset level pattern.

29. A wireless communications apparatus, comprising:

a memory that retains instructions related to obtaining a first loading factor based on at least a first loading offset information from a first base station during a first time slot, deciphering a first loading offset level pattern based upon the first loading offset information, generating a first interference ratio during a second time slot based on a first loading offset level recognized based upon the first loading offset level pattern, determining a second interference ratio during a third time slot based on a second loading offset level recognized based upon the first loading offset level pattern, the first loading offset level and the second loading offset level differing by at least 0.5 dB, transmitting a first signal that includes the first interference ratio during the second time slot to the first base station, and transmitting a second signal that includes the second interference ratio during the third time slot to the first base station; and

a processor, coupled to the memory, configured to execute the instructions retained in the memory.

30. The wireless communications apparatus of claim **29**, wherein the memory further retains a lookup table utilized to decipher the first loading offset level pattern based upon the first loading offset information.

31. The wireless communications apparatus of claim **29**, wherein the memory further retains instructions related to utilizing a predetermined function to decipher the first loading offset level pattern.

32. The wireless communications apparatus of claim **29**, wherein the memory further retains instructions related obtaining a second loading factor that includes a second loading offset information from a second base station during a fourth time slot, deciphering a second loading offset level pattern from the second loading offset information by employing one or more of a lookup table or a predetermined function, and generating the first interference ratio for transmission based on at least the first loading offset level recognized based upon the first loading offset level pattern and the second loading offset level determined by the second loading offset level pattern.

33. A wireless communications apparatus that enables evaluating an interference ratio based upon a dynamic loading offset level pattern, comprising:

means for obtaining a first loading factor based on at least a first loading offset information from a first base station at a first time slot;

means for determining a first loading offset level pattern from the first loading offset information;

means for evaluating a first interference ratio at a second time slot based on a first loading offset level determined from the first loading offset level pattern;

means for determining a second interference ratio at a third time slot based on a second loading offset level determined from the first loading offset level pattern, the first loading offset level and the second loading offset level differing by at least 0.5 dB;

means for transmitting a first signal that includes the first interference ratio at the second time slot to the first base station; and

means for transmitting a second signal that includes the second interference ratio at the third time slot to the first base station.

34. The wireless communications apparatus of claim **33**, further comprising:

means for obtaining a second loading factor that includes a second loading offset information from a second base station at a fourth time slot;

means for determining a second loading offset level pattern from the second loading offset information by employing at least one of a lookup table or a predetermined function; and

means for evaluating the first interference ratio based on at least the first loading offset level determined by the first loading offset level pattern and the second loading offset level determined by the second loading offset level pattern.

35. A non-transitory machine-readable medium having stored thereon machine-executable instructions for controlling a wireless mobile device, said non-transitory machine-readable medium including machine-executable instructions which when executed by a processor control said wireless mobile device to perform the steps of:

obtaining a first loading factor based on at least a first loading offset information from a first base station at a first time slot;

determining a first loading offset level pattern from the first loading offset information by employing at least one of a lookup table or a predetermined function;

evaluating a first interference ratio at a second time slot based on a first loading offset level determined from the first loading offset level pattern;

determining a second interference ratio at a third time slot based on a second loading offset level determined from the first loading offset level pattern, the first loading offset level and the second loading offset level differing by at least 0.5 dB;

transmitting a first signal that includes the first interference ratio at the second time slot to the first base station; and

transmitting a second signal that includes the second interference ratio at the third time slot to the first base station.

36. The non-transitory machine-readable medium of claim **35**, further comprising machine-executable instructions which when executed by said processor control said wireless mobile device to perform the steps of:

obtaining a second loading factor that includes a second loading offset information from a second base station at a fourth time slot;

determining a second loading offset level pattern from the second loading offset information by employing at least one of a lookup table or a predetermined function; and

evaluating the first interference ratio based on at least the first loading offset level determined by the first loading offset level pattern and the second loading offset level determined by the second loading offset level pattern.

37. In a wireless communications system, an apparatus comprising:

a processor configured to:

receive a first loading factor based on at least a first loading offset information from a first base station at a first time slot;

determine a first loading offset level pattern from the first loading offset information;

determine a first interference ratio at a second time slot based on at least a first loading offset level determined by the first loading offset level pattern;

determine a second interference ratio at a third time slot based on a second loading offset level determined from the first loading offset level pattern, the first loading offset level and the second loading offset level differing by at least 0.5 dB;

send a first signal that includes the first interference ratio at the second time slot to the first base station; and

send a second signal that includes the second interference ratio at the third time slot to the first base station.

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